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THE SENSE OF DENTAL AND LABIAL ARTICULATION IN ORTHODONTIC TREATMENT

CLIFFORD G. GLASER, D.D.S., BUFFALO, N. Y.

THE sense of dental and labial articulation is the primary factor which controls the development and preservation of the face and occlusion of the teeth. A study of the dynamics of oral physiology will reveal how the facial skeleton and teeth are nurtured into normal form and arrangement by the effort of the person to use these particular organs. He develops an individual pattern in functional activities and posture of the oral and facial tissues by practice much the same as he would develop his gait or stride in walking. This compares also with his grasping or pinching with the hands and fingers in the development of his manual dexterity. It depends upon what part of the body the person is directing his attention.

Perhaps everyone who attempts orthodontic treatment becomes conscious of this fact, but the control of these influences is generally so intangible that he is perplexed to put into practice little else than mechanical adjustment of the teeth.

When cases of malocclusion present themselves, we must be mindful of the fact that functional influences play the greatest role in determining normal care of the body throughout life. Therefore, we must be familiar with the nature of the functional influences associated most closely with the teeth.

The acts of mastication, speech, swallowing, breathing nasally are generally considered the fundamental functions of the mouth and lower face. There are, however, many variations in the manner of these functions and perhaps other auxiliary functions.

There is one function which we are generally unmindful of, and that is the act of biting. When I speak of biting, I mean the biting we do with the incisor teeth. I do not believe that many of us have been conscious of the fact that biting and chewing are not necessarily the same functional acts. The incisors are designed differently than the posterior teeth for a definite reason and that is to perform functions of a different nature.

Read before the Northeastern Society of Orthodontists, New York, N. Y., March 5, 1951.

Biting with the incisors is one of the most important guiding influences in the development of the face. It establishes the normal relationship of the jaws by alerting the tongue and all of the musculature into more normal action and balance.

It seems to me that incisal biting acts as a balance wheel in guiding the various physiologic activities of the mouth and that the assembly of all of the tissues of the face is affected by this action.

Clinical study can reveal a great deal in the picture of behavior which is the particular field that deals with the dynamics, stresses, and balance of pressures within the various tissues.

Bone forms the framework of the body and develops and maintains its form because it is constantly needed to bear stress in a definite direction to counteract gravity and muscular contractions.

Muscular tissue likewise develops and maintains its size according to the dynamic needs for functional activity.

In other parts of the body such as the legs and arms, there is a greater daily need for bone and muscle to adjust itself than there is in the facial area under the present manner of living. As we stand and walk and move about, using our feet, legs, arms, and hands, the body generally develops and maintains its bones, muscles, and other tissues in good size, form, and health.

This does not hold true to the same degree in the mouth and jaw areas because it is not necessary for the individual to make the normal biting effort in this present-day way of life.

Most of the patients who have malocclusions, caries, and deformities of the face are constantly satisfied with such food as milk, orange juice, and puréed vegetables.

You may realize that many of the necessary elements of diet are contained in these foods, but if a person were to subsist on this type of food, he might not make the normal effort to bite or masticate. As a result his teeth, jaws, and lower face would not be necessary. This is truly the case in varying degrees amongst our patients.

Candy and other sweets also generally upset their attitude toward eating such foods that require biting and chewing.

If one observes these young patients eating, he will note that they have their drink served with their meals, most generally. This I believe to be a wrong training influence because it upsets the person's normal manner of swallowing.

I should like to call your attention to the fact that there are two ways of swallowing, one with the teeth in occlusion, the other with the jaws separated. When drinking, we swallow with the teeth apart and when we are eating food which we have to masticate, the teeth are tightly clenched together during the function of swallowing. Clenching the teeth during the function of swallowing produces a thrusting action of the tongue in all directions. The tongue is also contained within its normal confines when the teeth are occluded during swallowing. However, if the teeth are drawn apart during swallowing, folds of the lips, cheeks, and tongue draw between the teeth and cause them to be separated and

forced out of occlusion and alignment. This is only one of the results of mixing the drink with the eating.

If one were eating a good-sized mouthful of food without any drink, he would probably swallow a half-dozen times or more before he would be satisfied that he is finished with the swallowing effort. Even after the food has passed the throat, he continues to clench his teeth together and to swallow hard. This is not the case when he eases up the effort by taking a little sip of liquid every few seconds while eating. Under such circumstances he will swallow only once or twice instead of swallowing the half-dozen times when he is eating without the drink.

I am quite convinced that this is one normal physiologic rule which we must obey to obtain the best facial development and good occlusion of the teeth. If you observe animals you will note that Nature serves the food or the drink, but not at the same time. When the animal drinks, he must go to a different place than where he is eating and he makes a business of drinking because he is thirsty.

We should train our children likewise to make a business of eating because they are hungry, and drinking because they are thirsty, but not at the same time. When food and drink are served at the same time, most generally it has an unbalancing influence on the dental articulation and muscular equilibrium of the whole face.

When one is eating without any drink and he is laboring to swallow, he sets his teeth together with a sense of determination and swallows hard again and again. This is one of Nature's ways of establishing and maintaining a strong feeling of normal occlusion of the teeth. It also establishes a more independent and normal occlusion of the lips, which in turn not only produces a more normal positioning of the tongue, but also innervates a thrusting, swelling pulsation of the tongue.

This tongue action can very readily be witnessed in cinefluoroscopic study. The film which Dr. Sidney Riesner has shown on several occasions portrays the positioning and thrusting action of the tongue during swallowing.

One revelation which came to me while watching this film was that the tongue gave a double thrust each time the person swallowed. The first thrust is a positioning of the tongue in harmony with occluding the teeth and the second thrust is associated more with the act of swallowing.

There is another aspect which I feel would be very important to investigate with this method, and that is the behavior and functional relationships of all of the tissues of the oral and facial areas, relative to speech. It would portray the functional relationship of the teeth and lips in articulation, as well as the jaw relationship and the facial contour while the person is speaking distinctly.

If we were to compare this record of the patient in the act of speaking distinctly with his usual manner of more indistinct speech, or with his usual facial posture, we might very well realize the needs of physical training influences in orthodontic treatment.

When a person is speaking distinctly, his jaws, teeth, and lips are functioning in an anterposterior relationship which is quite comparable to the relationship which exists when he is biting with the incisors.

In most of our cases of malocclusion, speech is not distinct and this should be recorded for consideration in diagnosis and treatment planning. It might be most helpful to record the speech qualities also in sound.

Physical medicine should be applied and practiced as a part of orthodontic treatment. What we need most of all in practice is some good physical culture of the mouth and lower face relative to all of its functions and posture.

On several occasions we have had reports of laboratory investigations of the muscle fibers to determine their characteristics, such as their ability to stretch or not to stretch or perhaps to determine the tonus of certain muscles or groups of muscles.

These reports are always rather interesting and are, without any doubt, quite important from a laboratory research viewpoint, but after we have this information, our patient continues to use his muscles in his own individual way in abnormal balance. Perhaps we should say he does not use them in normal balance or to the normal degree.

In almost all cases there is potential tissue substance, but the full capacity of function is not utilized. Consequently, the tissues are not unfolded and developed into normal form and size.

The function of the muscles in normal balance and to their normal capacity is dependent upon the innervation by the motor nerves and these in turn depend upon the mind of the person for their direction. Therefore, his attitude must be favorable toward normal efforts in function.

There are some normal rules of nature which we can follow to help direct these functional activities in the mouth and facial areas.

These rules conform with the behavior of an individual who instinctively makes all of his teeth, jaws, tongue, and muscles of the face important in his daily life. Living the hard way helps greatly to make our orthodontic appliance therapy more effective.

In a former presentation,[3] I attempted to set forth certain rules of nature which tend to control facial development and occlusion of the teeth. I am as much convinced today as ever that the patient's obedience to these basic and normal rules of nature is most essential to normal development of the jaws and occlusion of the teeth.

Gnathostatics and cephalometrics can record the effects of the individual's eccentric functional activity if we associate these records with our clinical study of the patient's behavior.

Our earlier considerations of gnathostatics as given by Simon helped us to a truer understanding of our field of operation by pointing out a standard or norm. This particular study made it possible for us to evaluate more clearly the nature of deformity of the facial skeleton and malocclusion of the teeth.

As an example of this, I might point out that vertical measurements were given more consideration than they had received previously. The relationship of the general plane of occlusion, as well as the dental units, to the horizontal (Frankfort) plane gave us another dimension to consider rather than the horizontal dimension. It is so easy to think only of horizontal dimension when crowding of the teeth is our problem. It is my opinion that we need to give attention also to variations of these dimensions in our research and practice.

Cephalometrics also has a great deal to offer in our appraisal of formations of the facial skeleton. It can bring to our attention deficient and perverted development of the different areas, as well as point out what the normal pattern of form should be.

If periodic cephalometric records are made during treatment, we should be able to determine better if growth and development are proceeding in a favorable direction. The cephalometer is an instrument which can help us very greatly in our diagnosis and treatment by pointing out the relationship of such areas as the lower border of the mandible to the Frankfort plane or the occlusal plane. It also establishes in our minds a better understanding of the relationship of the dental units to each other, as well as their positions and inclinations in the facial skeleton.

Cephalometrics operates on a flat plane basis at the present time. Nature, however, operates on a spherical basis and therefore we have to calculate to allow for difference. The dental arch forms are normally circular. Also, the mandibular and maxillary skeletal forms are spherical with the center located within the tongue mass.

Inasmuch as the tongue is located in this strategic position, we must realize that its dynamic influence should be given a most important part of our attention in diagnosis and treatment.

In a case of distoclusion, a forward positioning of the mandible or its dentition cannot be effected without a change in the pattern of balance of all of the various groups of muscles, and especially the tongue action. The individual's characteristic pattern of muscular equilibrium is dependent upon his attitude toward, and practice of, such functional acts as incisal biting, labial articulation, swallowing with the teeth in occlusion, and nasal breathing.

Although we might generally feel that the temporomandibular articulation controls the relationship of the jaws, it becomes more and more apparent to me that the incisal articulation is the primary influence which normally controls the jaw relationship. When a person makes an effort to bite or masticate, his mind focuses upon the teeth, but never upon the temporomandibular joint. Therefore, the dental (especially the incisal) articulation is the active and primary articulation of the jaws, whereas temporomandibular articulation is passive and secondary.

In Fig. 1 you will note comparative photographs showing the profile of a patient with a distoclusion open-bite. The pose on the left shows the usual facial posture of the patient, and the contrasting pose on the right shows the facial posture while biting on a small wooden bite-blade. I wish to call to your attention the relaxation of the mentalis musculature and the drawing up of the hyoid group of muscles as an immediate effect of incisal biting.

Fig. 2 shows the comparative direct views of the patient with the lips separated. The pose on the left shows that the median line of the lower denture registers to the left of the median line of the upper denture. The pose on the right shows that the median lines of the upper and lower dentures register in line when the patient is biting on the bite-blade.

I have observed that this median register is almost always manifested when a person makes an effort to bite with the incisors, regardless of his eccentric malocclusion.

Let us now consider some of the characteristics of specific types of cases, and the first case I should like to show you is a distoclusion Angle Class II, Division 1.

Fig. 1.

Fig. 2.

Fig. 1.—Photograph on the left shows general facial posture of patient. The comparative photograph on the right shows the immediate improvement of the facial posture caused by biting with the incisors on a small wooden bite blade.

Fig. 2.—Photograph on the right shows open incisal bite with median line of the lower denture registering to the left of the median line of the upper denture. The comparative photograph on the right shows the upper and lower median lines registering in line when the patient is biting on a small wooden bite blade.

Figs. 3 and 4 show a condition of distal position of the mandible with muscular imbalance of the face at the beginning of treatment and a comparative change in the muscular balance of the face after functional training and appliance therapy had been applied.

Please note the strain and distortion of the features in Fig. 3. The expression of the face indicates how the whole muscular system is out of balance. Notice the tension of the mentalis group of muscles caused by the habit associated with swallowing with the teeth apart instead of in occlusion. There is also a sagging of the hyoid group of muscles which counterbalances the mentalis group. By studying this face, one can visualize the sucking influence being exerted against the mandible and its dentition.

Fig. 3.

Fig. 4.

Fig. 3.—Photographs showing direct and profile views of the face before treatment.
Fig. 4.—Photographs showing comparative direct and profile views of the face due to training more normal habits of dental and labial articulation.

Now in comparison, I should like to call your attention to the more reposed expression of the face in Fig. 4. This pose is the result of treatment in which the patient was trained to a stronger and more normal sense of dental and labial occlusion. I wish you would notice that the lower labial tissues are drawing in line with the upper lip and escaping past the upper incisors instead of

interfering between the upper and lower teeth. When the patterns of labial articulation and dental articulation are strong and independent, there is a favorable reaction of all of the muscles of the face and neck to act in normal balance.

When the lips are cooperating to their full normal degree in occlusion and articulation, the maxillary and mandibular skeletons and teeth are suspended in normal relationship by the labial and buccal tissues of the face on the outside and a sympathetic supporting influence of the tongue on the inside. The proper direction of the action of the tongue in posture and function requires the support and drawing up of the hyoid group of muscles. This can be seen in the photograph on the right.

The comparative photographs, I believe, illustrate the results of change in the physiologic dynamics pattern rather than a mechanical adjustment of the teeth and facial skeleton by appliance traction.

Fig. 5, the direct view record casts of the case, shows the change in the occlusion of the teeth in the first stage of treatment. The first stage of treatment was with the use of intermaxillary elastics and training exercises. The training exercises consisted partly of biting with the incisors on a little wooden blade about one inch long for about fifteen minutes each morning and evening, until the blade was chewed up into pulp. The patient was also forbidden to have the drink on the table during mealtime.

I should like to point out at this time that we should not interfere with the patient's drinking a reasonable amount of milk, but it should be served as a beverage before or after the meal. If the person has a sufficient amount of moisture in his system, the drink would be better served after the meal and between meals. Under these circumstances there will be more active mastication and a good supply of moisture, and therefore the saliva will flow more normally and be more thoroughly distributed to the surfaces of all of the teeth to preserve them against the acid reactions which occur in inactive areas of the mouth. The saliva is the normal preservative of the teeth and it must be constantly distributed to their surfaces to counteract caries.

If we follow the rule of leaving the drink off the table during the mealtime, the patient will soon give up his complaint of choking every time he takes a mouthful of food.

Fig. 6 shows the change in the occlusion of the teeth during a second stage of treatment which will be described later.

Fig. 7, the two sets of casts of the right side, shows a comparative record at the beginning of treatment and at the end of two stages of treatment. Please notice how the line of occlusion of the upper original cast has a vertical reverse curve. The premolars and cuspids are higher than the molars and incisors. This is the result of sucking the lower lip beneath the upper incisors and a fold of the cheek up against the occlusal surfaces of the premolars and cuspids.

The same influence is working against the lower incisors. Not only are the lower incisors under this muscular influence, but also the whole mandible is under tension and being forced backward. When this pattern of tension is operating from the outside of the mandible, there is a sympathetic disturbance of the musculature inside of the mandible and its dentition. Instead of the

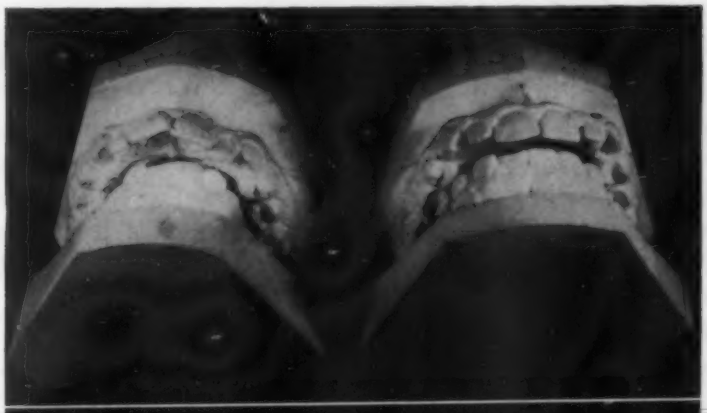

Fig. 5.

Fig. 6.

Fig. 7.

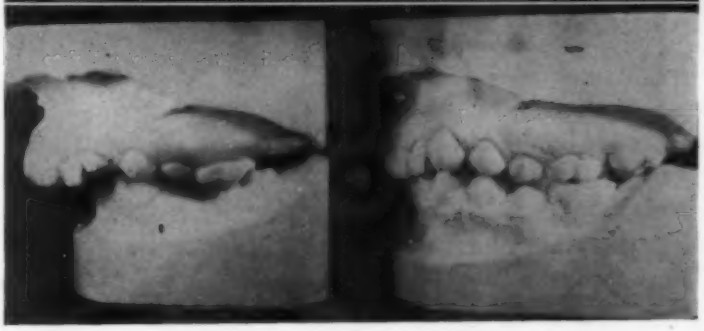

Fig. 8.

Fig. 5.—Comparative casts show change in the incisal occlusion during the first stage of treatment.

Fig. 6.—Comparative casts show change in the incisal occlusion during the second stage of treatment.

Figs. 7 and 8.—Comparative casts show changes in occlusion of the right and left sides during the two stages of treatment.

tongue and all of its auxiliary musculature giving a positive support to the mandible in its normal prognathic position, it develops a negative influence by drawing backward and inward.

Now I wish to call your attention to the cast on the right in comparison. This shows that the line of occlusion is straightening out vertically as the patient is approaching more normal occlusion. All of the teeth, both upper and lower, are assuming more upright positions because the mandible is moving forward to its normal position which allows an adequate base for the denture. This is taking place as a result of the functional training being carried out by the patient rather than by traction of the appliance.

Periodic cephalometric records during treatment would undoubtedly reveal where all of the changes take place. I suspect that a great deal of this change takes place in the condylar process and that this tissue is potentially more plastic and adaptive to change than we have formerly been aware of. However, I believe this readaptive change will take place only according to our ability to change the pattern of physiologic dynamics associated with muscular equilibrium in the habits of articulation of the teeth and lips.

Fig. 8 shows record casts of the left side of the patient at the beginning of treatment and at the end of a second stage of treatment.

The second stage of treatment is one in which I used an appliance which I call an incisal guide lock appliance. It is a bite plate appliance which has a somewhat different design from the usual bite plate.

Fig. 9, the photograph of the appliance, shows the occlusal view taken in the mouth by mirror reflection. That part of the appliance just lingual to the upper incisors is built up to a flat plane at the same height as the incisal edge of the incisors. The plane extends backward far enough to prevent the lower incisors from biting posteriorly.

The anterior edge is cut at a sharp bevel in a uniform symmetrical arc so that the lower incisors will fit into the groove formed by the appliance and the upper incisor teeth.

When the patient attempts to bring the teeth into occlusion, he finds the flat plane interfering with the usual closure of the lower incisors in the backward position. In an attempt to find a place to set his teeth together, he slides the lower teeth forward where they drop into the groove and they lock in this position.

The success of the use of this appliance depends upon the patient biting into the groove while swallowing. If he sucks on the appliance so that the upper and lower teeth are not inocclusion, but are apart during the function of swallowing, the action of the tongue will not be properly directed outward against the facial skeleton and teeth.

Fig. 10 is a photograph of the right side during the second stage of treatment showing the upper and lower molars beginning to come into contact and also engaging in a more normal mesiodistal relationship. When the molars begin to occlude at the same time that the patient is closing his lower incisors into the incisal lock, there is a tendency for the patient to become more accustomed to the new and normal occlusion and to forsake the old distocclusion.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 9.—Photograph of palatal view of incisal guide lock appliance in the mouth.

Figs. 10 and 11.—Photographs of the right and left sides of occlusion with incisal guide lock appliance in position. Note that the posterior teeth are approaching occlusion and indicating a vertical change in the posterior occlusion. The lower premolars, which were very tardy in eruption, are now beginning to erupt. The eruption of these teeth is stimulated to the greatest degree by stresses through the bone produced by incisal biting.

Fig. 11, a photograph of the left side, indicates the occlusion of the teeth closing more rapidly than it is on the right side. This appliance will be effective only as it is used as an instrument in a definite functional training program.

One of the most effective exercises to train the lips into a strong sense of cooperation, and to develop all of the muscles of the face and throat into more normal equilibrium, is to take some water in the mouth at least every morning and evening immediately after brushing the teeth and force it through from the lingual to the buccal and labial sides of the teeth. The teeth should be kept tightly occluded which will produce a strong back pressure, and the whole face and throat will feel very tired and achy in just a minute or two. When this exercise is practiced with the incisal lock appliance in position, all of the tissues of the face and throat are trained to better posture and function.

I should like to bring to your attention some effects which I have observed in the use of this appliance. The first of these is that the incisors seem to assume a more upright position without the support of any other appliance. Another effect is that the lower incisors are relieved of the crowding as soon as all of the teeth become properly engaged in occlusion. At this stage, I generally remove the lower appliance.

Fig. 12 shows record casts of a boy who had become quite deaf. The parents consulted me about the possibility of his malocclusion causing the deafness. I explained that it would be difficult to predict the effect of treatment of the malocclusion on the deafness, but I felt some correction of the malocclusion was indicated. In the treatment of this patient, I used no other appliance except the incisal lock appliance. After about three appointments, he did not return for about eight months with the results of change in the occlusion shown in the comparative casts.

Fig. 13 shows the right side of the same casts. Note the change in molar relationship. Fig. 14 shows the anterior view.

Fig. 15 shows a photograph of the right side. The molar relationship recorded with the casts is hereby verified. Fig. 16 shows a photograph of the left side. Fig. 17 shows a photograph of the anterior view. Incidentally, the father of the boy reported that the patient's hearing had improved and was quite normal.

It is not my purpose to introduce this appliance as a revolutionary type of appliance or treatment, but merely to report some observations of its influence to alter the abnormal sense of occlusion of the teeth and muscular equilibrium.

I might point out what it does in operation. First it interferes with the original sense of malocclusion by throwing the teeth out of gear. Then it establishes the normal incisal relationship in centric occlusion. When the incisors are occluding in this position during the function of swallowing, the lips are also brought into normal occlusion and the tongue bears to the support of the whole lower face.

There are some cases where it is advisable to extract some of the teeth so that we may establish a better alignment of the incisors and engage them into more normal articulation.

If we could be sure that we cannot direct the patient's growth along normal paths and that there will not be sufficient growth in the future, then I should agree that it would be good judgment to abort the premolars rather than allow them to crowd the rest of the teeth for a period of time only to extract them later. The closure of the space would be more complete.

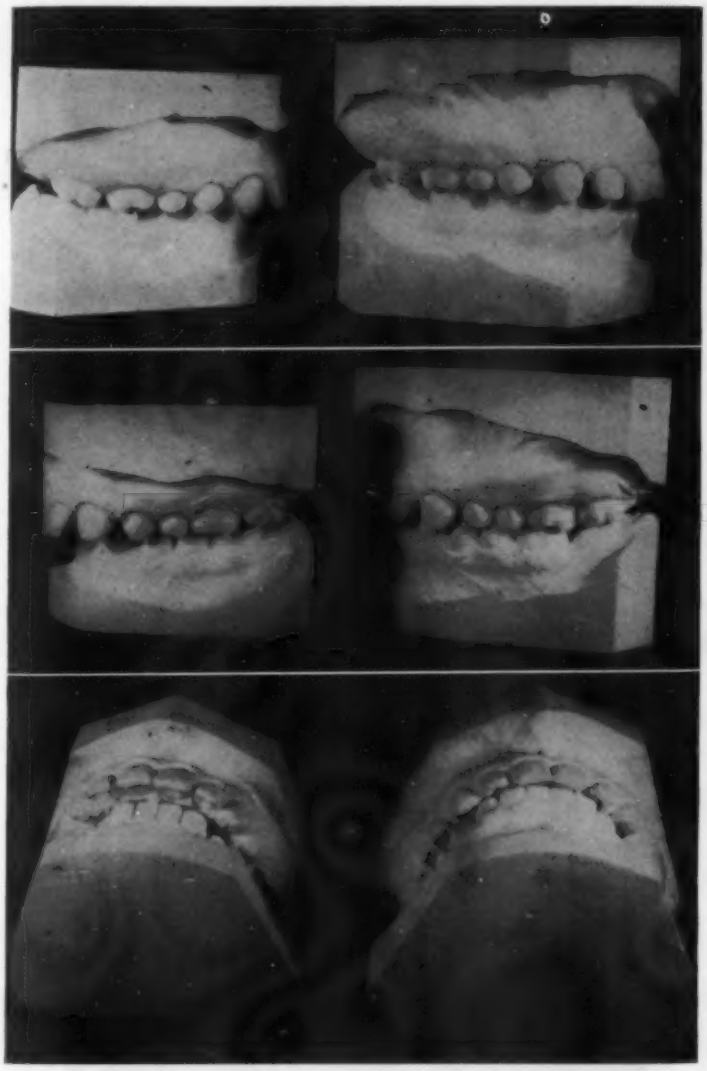

Fig. 12.

Fig. 13.

Fig. 14.

Figs. 12, 13, and 14.—Comparative casts show right, left, and anterior views of changes in the occlusion of a patient by using only the incisal guide lock appliance and with no labial wire attached. The deep bite and diastema of the incisor area will be reduced by the use of an appliance with the labial wire.

I have always been a little more conservative about the extraction of teeth until I could feel convinced that functional behavior cannot be favorably developed. This cannot be determined before the patient has reached a reasonable age. It is only when he takes enough personal interest in his teeth and appearance to cooperate in training normal habits of function that it is possible to direct the development of the face along normal paths.

We cannot predetermine how a person will change in his interests and habits in life. It becomes a problem similar to telling his fortune.

There have been several occasions in my practice where response to treatment of a boy's malocclusion was not very satisfactory up to a certain time of his life before he was sent to a military academy. Then with the same treatment we began to receive good results.

Fig. 15.

Fig. 16.

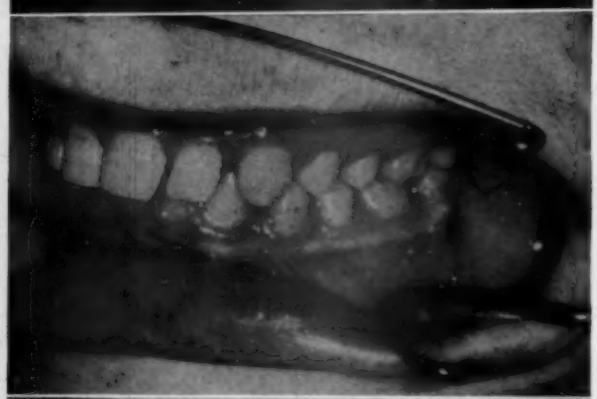

Fig. 17.

Figs. 15, 16, and 17.—Photograph of the right side of occlusion of same case after patient was absent for eight months.

The routine schedule of general physical training of the whole body was reflected in his facial development. His teeth and jaws were trained in normal physical action as they should have been in his earlier life.

Only as the person will change his pattern of behavior are we privileged to improve the developmental pattern to approach fuller growth and development.

If we do not practice physical medicine to direct the pattern of growth, the habits of behavior will continue in the same direction and reduction of tooth structure becomes more imperative.

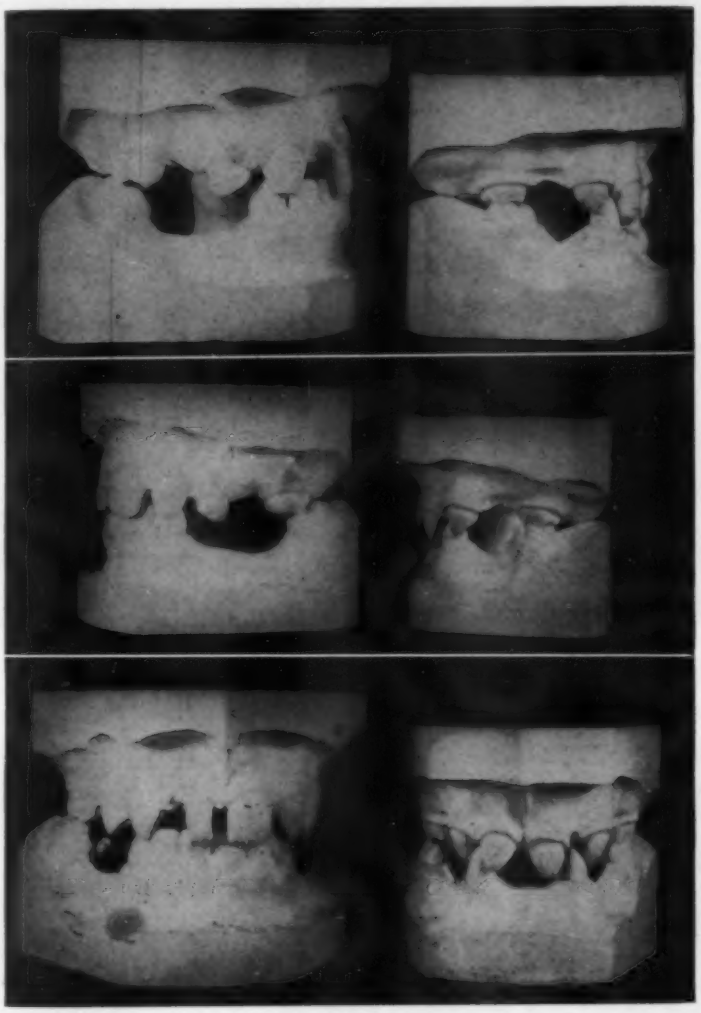

Fig. 18.

Fig. 19.

Fig. 20.

Figs. 18, 19, and 20.—Casts of two patients with anodontia, showing right, left, and anterior views.

I do not believe that extraction of the teeth determines the contour of the face as much as we have formerly felt that it might. There are too many other factors dealing with the situation of the incisal dentition in its relation to the cranium. When all functional activities are properly established and normal, the face is supported mainly by its muscular mass rather than by the teeth alone. As stated by Brodie,[2] "The teeth and alveolar processes should be looked upon as passive though responsive victims of a continuous interplay of muscular forces, their positions dictated by the resultants of these forces."

I think the two cases of anodontia shown in Figs. 18, 19, 20, 21, and 22 illustrate this point very well. Fig. 18 shows the right side of the two patients, Fig. 19 shows the left side, and Fig. 20, the anterior aspect. Fig. 21 shows a lateral plate x-ray of the patient on the left, and Fig. 22 shows a photograph of the face of the boy whose cast was shown on the right. There were only

Fig. 21.—A lateral head radiogram showing the facial skeleton and teeth of the patient whose casts are shown on the left in Figs. 18, 19, and 20.

Fig. 22.—Photographs of direct and profile views of the face of the patient whose casts are shown on the right in Figs. 18, 19, and 20.

four teeth present in the lower jaw in this case, a molar and a cuspid on each side. In the upper jaw there were six teeth, a molar, a cuspid, and a central incisor on each side.

The relationship of the upper and lower teeth was nearly perfect although they had no adjacent supporting teeth on either side. This boy made the best of what he had in the use of his teeth and nature compensated for his deficient amount of tooth structure.

The more successful use of extraoral anchorage also depends upon the sense of dental and labial articulation and muscular equilibrium.

The headcap as originally designed by Angle was placed on the cranium so that good counteracting anchorage could be secured by the bony framework of the head. This particular principle of design was not as efficient as the more modern designs of extraoral anchorage gear which is placed below the occipital portion of the head and rides on the neck.

When the pressure of the gear tips the head downward, the patient reacts to thrust the tongue and lower jaw forward and upward to establish a stronger sense of dental and labial occlusion. This is probably the reason appliances on the lower teeth are less necessary in many cases when they are treated with this type of appliance.

As a matter of convenience to the patient the headgear is generally worn at night. I suspect that the treatment would be a great deal more effective if the patient could wear the appliance while he is awake, so that he might feel the action of his appliance and be guided into more normal habits of incisal and labial articulation. Training these habits requires at least subconscious effort on the part of the patient.

Shortly after a person is born he feeds instinctively by sucking. By this effort he alerts the muscular action of the whole face and throat to establish a guiding influence of the tongue working in sympathy with the lips and jaws.

This particular muscular action has a stimulating and molding influence on the jaws in filling them out to normal form and in normal relationship.

Sucking is a normal function for this stage of life, but when teeth appear nature is telling us that we must graduate from the sucking stage to the biting stage of life. It is a normal process in the development of the child, and he should instinctively change his habits from sucking to biting if he is properly trained to do so.

Parents very frequently train their children to continue with sucking the thumb, the blanket, or other objects by not affording them the tougher foods or other objects to bite. In the past years we have become very conscious of the great food values in milk, strained vegetables, orange juice, and so forth. These foods contain many of the necessary mineral elements and vitamins necessary for life, but the person does not need to bite and masticate in assimilating this type of food. This is baby food, and by providing the child with only this type of finely prepared food, the parents interfere with the child's natural reaction to bite. It is because of this training that many children are frustrated

and continue to hold onto the sucking stage of life. Thumb-sucking is an indication of this abnormal adjustment in life. Only when the child is able to feel a strong sense of articulation of his teeth will he give up the sucking attitude.

We might compare this sort of training with other parts of the body, such as the feet and legs. If the child continued to creep longer than the normal time without making an attempt to walk, everybody would be concerned about the fact and a correction would be made immediately. However, when the natural habits of function of the mouth and face are not normally instituted in early life, nobody pays attention to the fact until several years later.

If we are ever going to be able to practice preventive orthodontics, it will have to be by education of the parents and all people responsible for training the child in normal functional activities of the mouth in these earlier stages of life. This is the time when habits are best set to control the degenerative processes of the tissues of the mouth later.

In reviewing all of the various malocclusions of the teeth, I have found the prime basic causative factor to be a deficient or perverted sense of dental (incisor) and labial articulation.

When many children are eating, they have a tendency to avoid biting with the incisors and when it is absolutely necessary for them to bite, they bite off to the side. It is because of these habits that the incisal teeth develop various malocclusions such as deep-bites, open-bites, cross-bites, crowding of the teeth, and distal and mesial occlusions.

The constant action of the tongue working in harmony with the lips and the teeth, especially the incisors, needs training and proper direction of behavior of these organs in much the same way that a person needs training in all other ways of living.

If the patient were eating an apple without having it cut up into small pieces, he would necessarily have to bite with his incisors. If he were eating an orange instead of drinking orange juice, he would bite and use his incisors. This action produces proper positioning of the mandible and normal engagement of the teeth.

As patients grow up and become more sophisticated, it has seemed to me that many of them do change favorably in these functional acts and habits. Their tastes change for different foods. They are trained to speak more distinctly. They brush their teeth better because they take a personal interest in their own welfare and appearance. As a result all of the various tissues and organs become more specialized in their various functions.

These facts were borne out by Björk in his investigation of 322 12-year-old boys and 281 Swedish Army conscripts. One result of his investigation showed that the incisors tend to upright with growth. Another result was that the inclination of the occlusal plane was diminished during this growth period, the change being accounted for by an increase in the height of the ramus.

In my mind the uprighting of the incisors and the posterior vertical development of the face are the results of more normal functional activities.

Let us wonder what the results would have been if the adults were not Swedish Army conscripts but rather a more inactive group.

SUMMARY

In summary I should state that the final results of orthodontic treatment are determined by the way the patient centers his teeth in occlusion during the function of swallowing.

The state of occlusion of the teeth and muscular equilibrium of the face depends, to the greatest degree, upon the ability of the patient to swallow with his teeth in occlusion. This ability is dependent upon his effort to engage his teeth and lips in normal habits of dental and labial articulation.

It has been stated in a text called *The Thinking Body*[5] that "Mechanically, physiologically, and psychologically, the human body is compelled to struggle for a state of equilibrium." This rule applies specifically to us in our treatment of the facial area of the body, and so it is that when we are able to align the upper and lower dental units and bring them within range, it becomes necessary to train the patient to engage them in all of their various normal functions and posture.

Whether or not we may feel that extraction of the teeth is necessary in any particular case to allow the best alignment of the teeth and contour of the face, the eventual success of treatment depends upon the patient's attitude toward the use of his teeth in everyday living. Therefore, the patient must be trained and educated in the normal habits of function and posture of the mouth and face. The person must feel that his teeth, jaws, mouth, and face are needed and important in his daily activities of life.

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CLEIDOCRANIAL DYSOSTOSIS IN FOUR SIBLINGS

HENRY C. SANDLER, D.M.D., M.P.H.,* NEW YORK, N. Y.

CLEIDOCRANIAL dystososis is of particular interest to the dentist because it involves delayed eruption, multiple impaction, and absence of teeth. The most commonly associated characteristics were described by Marie and Saintora[1] in 1897 as aplasia of the clavicles, brachycephaly, persistent fontanelles, and hereditary transmission. Since then more than 140 cases have been reported, and Miles[2] has reviewed the literature back to a report by Meckel in 1760.

Although the defect has been attributed to mechanical intrauterine effects, faulty implantation, fetal rickets, endocrine disturbance, and syphilis, there is no real evidence to support any of these contentions. The modern consensus seems to be that the disease is not of any specific origin other than some primary change in the parenteral germ plasm.[2, 3, 4, 5]

Cooper[6] listed 96 different abnormalities that have been associated with the syndrome, mostly of a skeletal or muscular nature. The defective bones are usually of membranous origin, but bones of cartilaginous origin are also affected. The clinical manifestations are characterized by the complete or partial absence of the clavicles. Sometimes the two ends are fairly well developed and are joined by a narrow fibrous strip which gives the appearance of a fracture on the x-ray plate. Because of the absence of the clavicles the shoulders can be approximated to an unusual degree. The cranial bones are delayed in their ossification so that the fontanelles are slow to close and wormian bones are often present. The facial bones are underdeveloped, especially the maxilla and mandible, and the cranium is wide in relation to its length. Deformities of other bones, fingers, toes, and delayed ossification of the pubic bones have also been observed.[4] Variations of the defect occur frequently even among siblings, taking the cleidal as well as the cleidocranial form, but the delayed and impacted dentition seems to be consistent insofar as can be determined.

The exact hereditary pattern is not clear since of 132 typical cases reported by Miles, 47 per cent were familial and hereditary and 53 per cent were sporadic. The defect may originate as a mutation and be transmitted as a dominant mendelian factor. Sporadic cases which seem to have no hereditary background may nevertheless originate from the same gene as a recessive characteristic. In view of the fact that a dominant gene can be modified by other genes, natural selection would tend to suppress this unfavorable gene with succeeding generations, and the same gene tends to become more and more recessive.[7]

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*Assistant Director, Bureau of Dentistry, Department of Health, City of New York.

CASE REPORT

Through the New York City Department of Health Orthodontic Care Program, four siblings were found who were handicapped by missing and malposed teeth: a girl of 16, fraternal twins of 15, and a girl of 14. All were

Fig. 1.—Study casts of four siblings, right, front, and left views.

in good health, seemed to be of normal intelligence, and were in the average school grades for their ages. Their only complaint was that their appearance was marred by the absence of so many front teeth. They had experienced no difficulty in masticating their food even though very few teeth were in

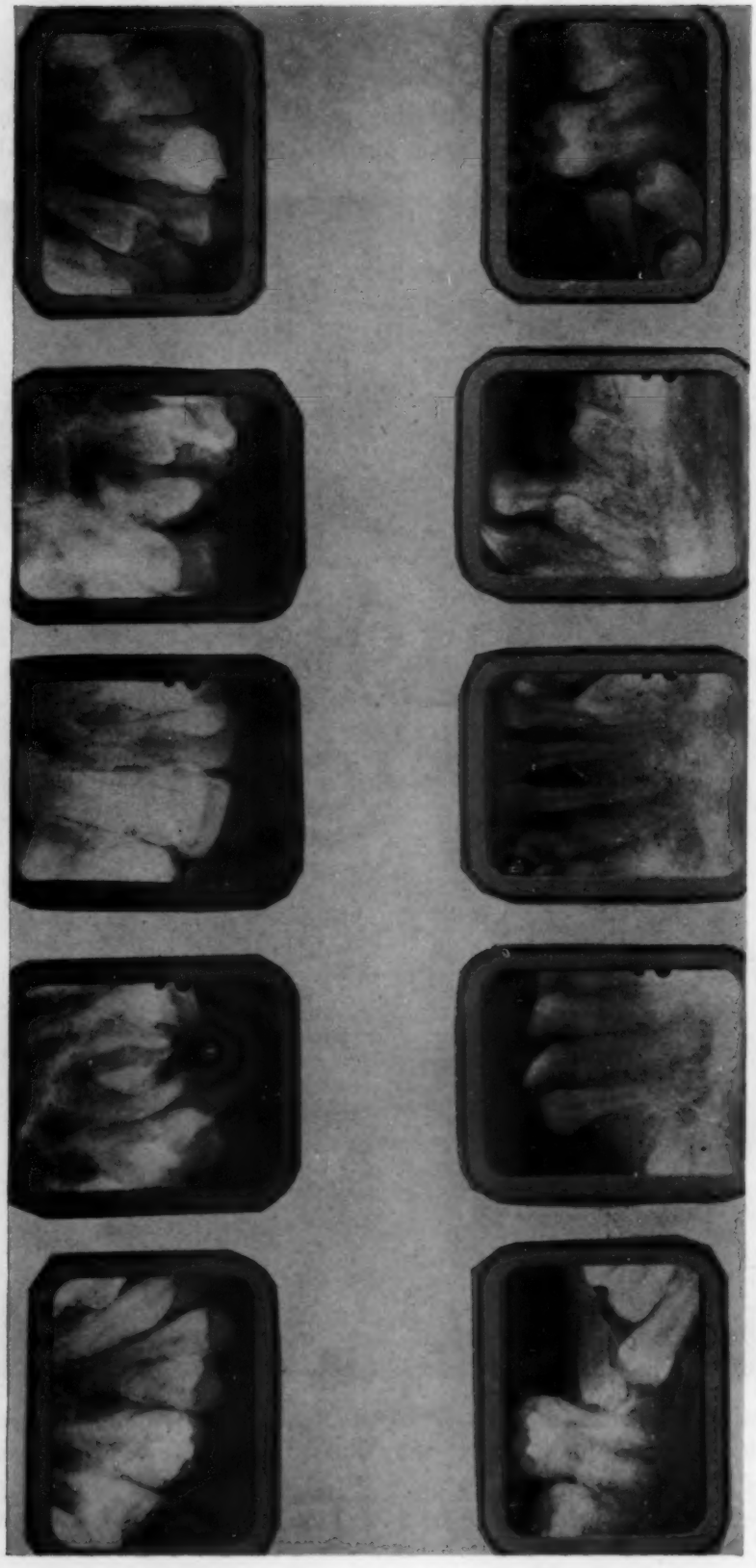

Fig. 2.—Intraoral x-rays showing impacted and supernumerary teeth. Sib. II-3.

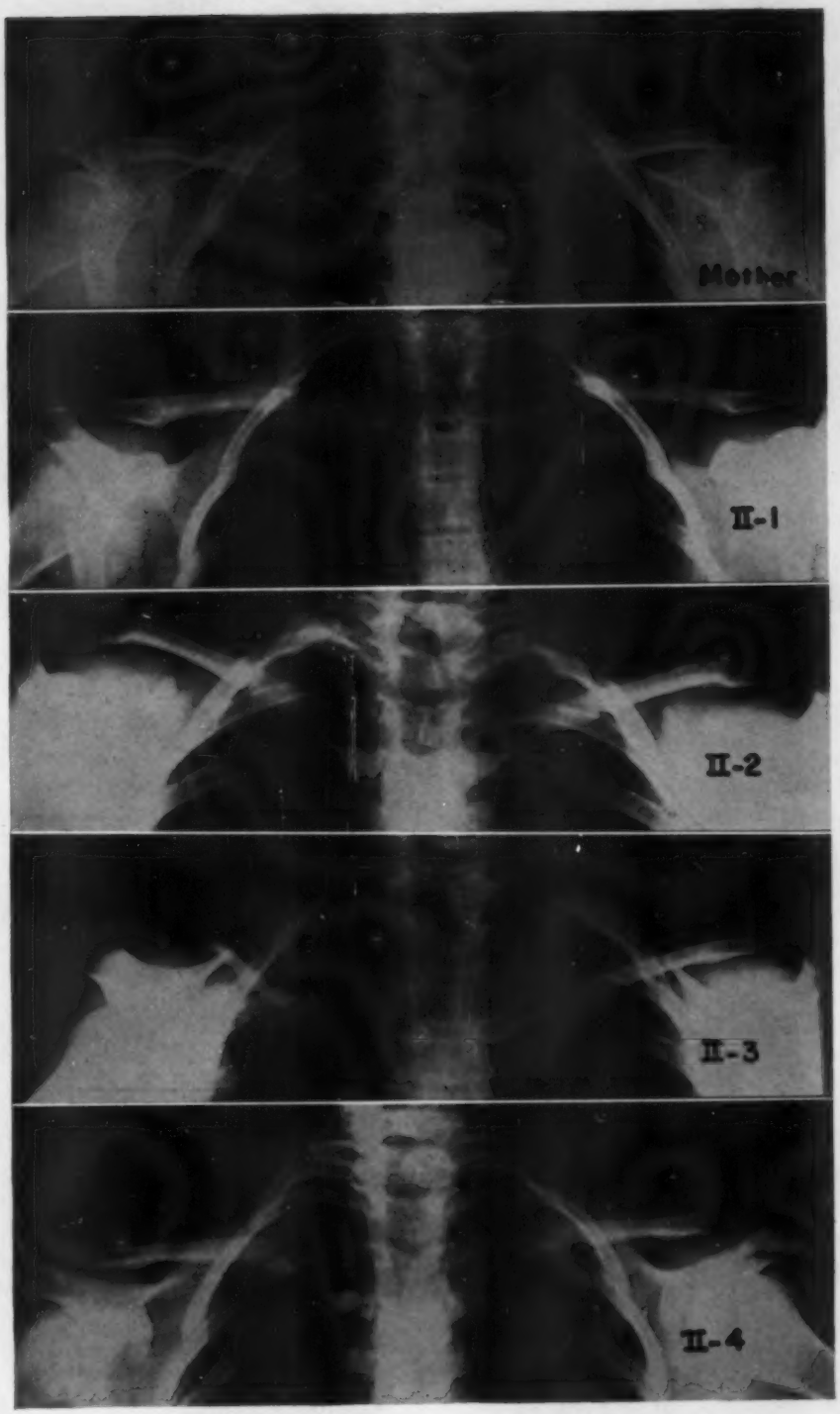

Fig. 3.—Partial aplasia of the clavicles of a mother and four siblings.

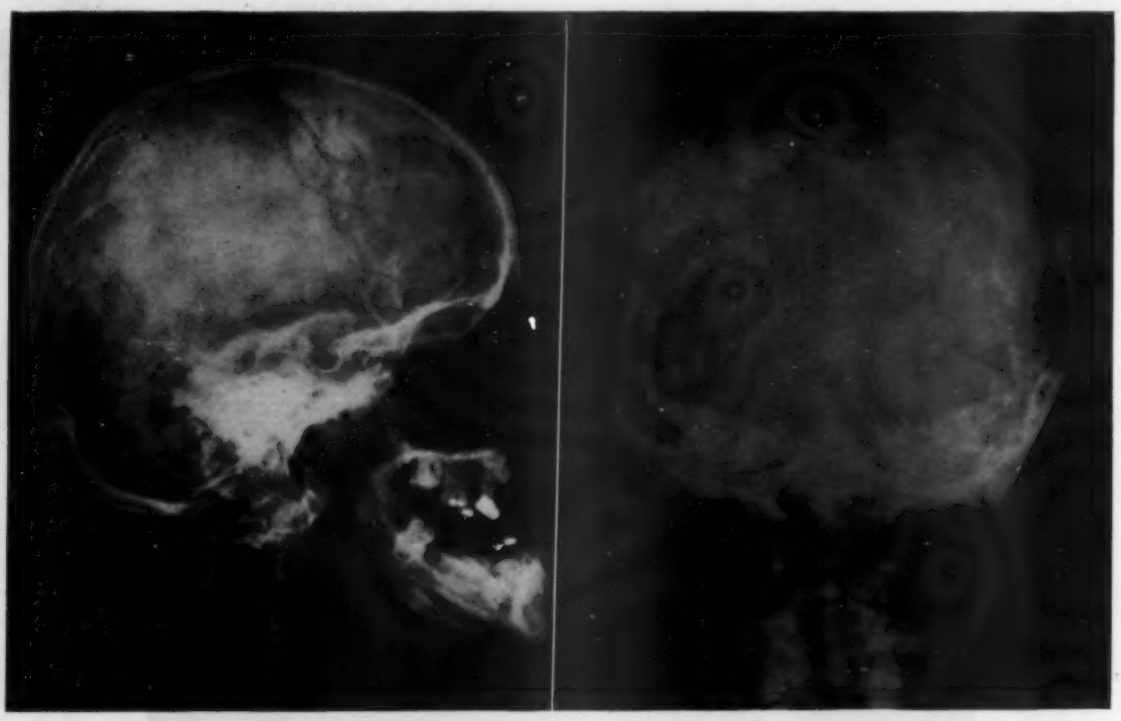

Fig. 4.—X-rays of skull showing wide open sutures, open fontanelle, and wormian bones. Sib. II-1.

Fig. 5.—X-rays of skull showing open sutures, open fontanelle, and wormian bones. Sib. II-2.

occlusion, and they were quite accustomed to managing without teeth. They also reported a history of delayed exfoliation of the deciduous teeth and late eruption of the permanent teeth that were visible.

Examination showed that many teeth were missing in the upper and lower jaws in all four of the children and that caries was unusually active. Very few of the teeth that were visible had erupted to the full height of the crown and many were only half erupted (Fig. 1). Intraoral x-rays disclosed that there were many unerupted teeth, mostly impacted by supernumerary teeth or inclined against the roots of other teeth. Fig. 2 is typical of the dental x-rays.

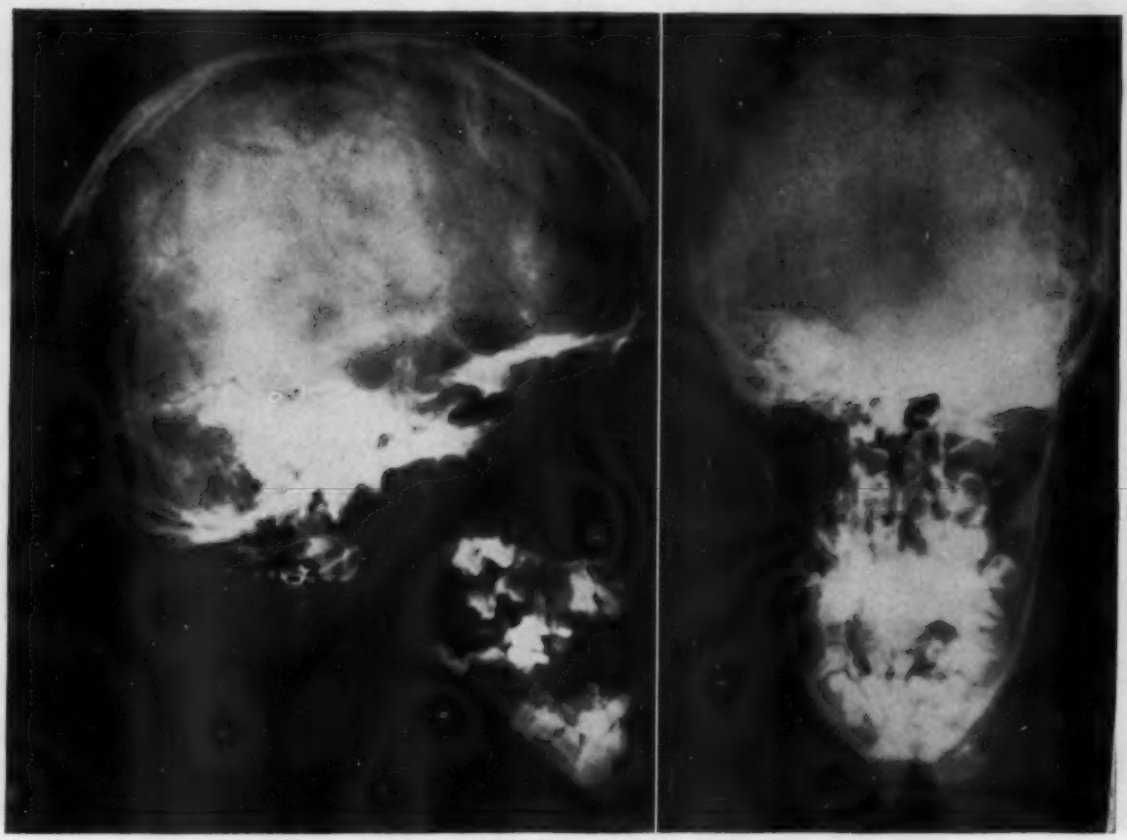

Fig. 6.—X-rays of skull showing open sutures and wormian bones. Sib. II-3.

The familial similarity led to the suspicion that these children suffered from cleidocranial dysostosis. X-rays of the chest and skull demonstrated all four children had a partial aplasia of the clavicles (Fig. 3), that the sutures of the cranial bones were exceptionally wide, and that wormian bones were common (Figs. 4 to 7). The skulls appeared unusually wide laterally and their high cephalic indices classified them as definitely brachycephalic. Due to the partial absence of the clavicles the shoulders could be approximated to an unusual degree (Fig. 8). One of the children showed some slight deviation from normal terminal phalanges.

Examination of the mother revealed that she too had a clavicular dysplasia (Fig. 9) and, although she wore full upper and lower dentures, there were several unerupted teeth in the upper and lower jaws. The mother gave a history of irregular and slow eruption, extraction of impacted teeth, and rapid caries. She was not aware of any ancestors who had the defect, but her sister had also had many teeth missing. The sister could not be reached for confirmation, but the father of the siblings was a patient at Kings County Hospital and chest x-rays revealed no abnormalities. The pedigree of this family tends to support the hypothesis that the defect originated as a mutation and was transmitted as a dominant mendelian factor.

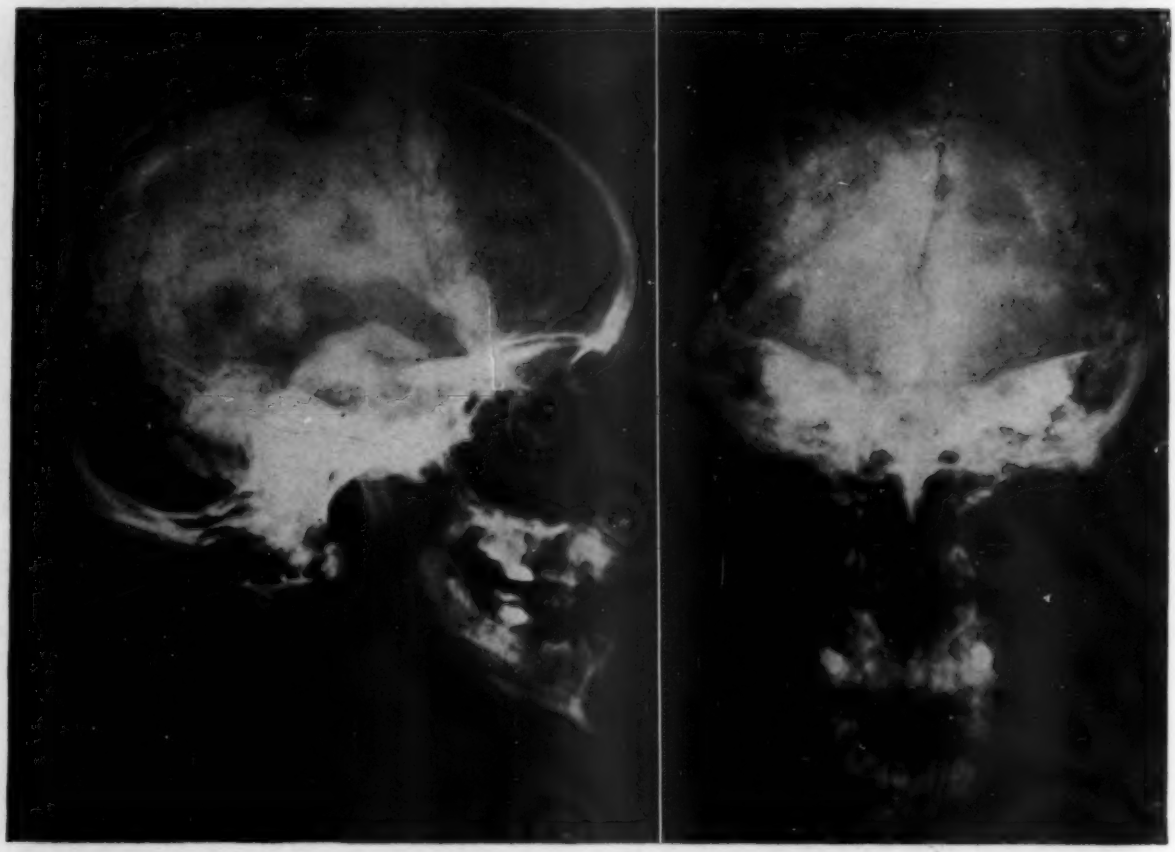

Fig. 7.—X-rays of skull showing wide open sutures, open fontanelle, and wormian bones. Sib. II-4.

Treatment.—The cleidal manifestations of the disease had produced no inconvenience but the dental abnormalities presented many problems. There was some possibility that the judicious extraction of some of the impacted teeth, either with or without orthodontic assistance, would permit the eruption of others. The prognosis for such a course of treatment was doubtful and the surgical risk hazardous.

In any case, these patients were adolescents to whom appearance was of the greatest importance and all were quite resistant toward surgical pro-

Fig. 8.—Approximation of shoulders made possible because of partially missing clavicles.

cedures. After study, it was decided to keep the three younger children under observation but there was little point in delaying treatment for the oldest girl. Accordingly, several infected and malposed anterior teeth and two lower posterior teeth were extracted. The prognosis for successful rehabilitation was, nevertheless, poor because the few remaining teeth were extremely short and tapered so that they could not retain a partial denture. Furthermore, the maxilla was so grossly underdeveloped that the alveolar arch and the remaining teeth were in lingual relation to the lower jaw.

Fig. 9.—Mother—x-rays of skull show wide open sutures.

Treatment is now under way to expand the upper alveolar arch insofar as is practical. Thereafter, cast crowns will be constructed with sufficient bell shape to retain an upper and lower denture.

SUMMARY

Cleidocranial dysostosis, although characterized by dysplasia of the clavicles, is of particular interest to the dentist because it almost always involves delayed eruption, multiple impaction, supernumerary and missing teeth. Its occurrence in four siblings and the mother emphasizes the hereditary nature of the defect and supports the hypothesis that it is a dominant charac-

teristic which may be of sporadic origin. The multiple impactions and delayed eruption make the problem of dental rehabilitation extremely complicated and the prognosis is very doubtful.

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BASIC PRINCIPLES VERSUS "SYSTEMS"

DAVID MOSSBERG, D.D.S.,* NEW YORK, N. Y.

I. INTRODUCTION

MALOCCLUSION of teeth and malrelation of the jaws should be approached from the standpoint of genetic pattern, growth, development, function, and inherent factors of stress. The orthodontist must recognize these groups of biologic processes because, in the final analysis, they determine the extent of successful treatment of cases of malocclusion, regardless of the type of mechanical appliance used.

The orthodontist has a limited area in which to work. This area includes the teeth, the alveolar bone, and adjacent structures which affect the final positional relationship of the teeth. Therefore, to accomplish his objective successfully, it is of prime importance for the orthodontist to be well grounded in the basic principles of tooth movement, as distinct from so-called "systems" in orthodontic mechanotherapy.

II. LIMITATIONS OF ORTHODONTIC THERAPY

A. *Laws of Variation.*—Variation[1] of the individual is the direct result of heredity and environment. It is commonly believed that pure or selective breeding with the proper environment would tend to produce individuals with the same characteristics. The results of nonselective breeding, on the other hand, are entirely different and are unpredictable, as far as the individual is concerned. Stockard,[2] in his experiments of mixed breeding of physically perfect types of dogs, found that there was no harmony in the component parts of the bony skeleton resulting from such matings.

Malocclusion of the individual, where local causative factors are not in question, is the expression of inharmony between adjacent and remote parts of the mouth and may be ascribed, as Brodie[3] stated, "to chance operation of genetic laws."

The orthodontist, in planning his treatment of malocclusion, should endeavor to obtain the best possible balance of the teeth within the limits of the inherent growth forces and the musculature environmental to the denture, even if the occlusion attained is far from the hypothetical ideal.

B. *Limitations.*—1. The pattern[4] of bone is not only genetically determined, but also so developed as to best resist functional stresses for which it was intended. These stresses can be increased without harm, providing the increased force is directed along the lines that the bone was phylogenetically designed to withstand. A functional force, no matter how slight, that acts

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*Member of Orthodontic Staff, Mount Sinai Hospital; Boys Club of New York.

upon bone in a direction which it was not phylogenetically designed to withstand, produces deformity. To counteract such force, the inner architecture of bone arranges itself in stress lines or trajectories along the main line of force.

These "lines of stress" or trajectories within the jaws were studied by Benninghoff and described by Salzmann.[5, 6] They are included in a closed functional system, which functions whenever the muscles of mastication contract to exert pressure on the mandibular teeth. The functional pressure is transmitted from the mandible to maxillae where it is channeled through to three trajectorial systems which connect to the frontal, zygomaticotemporal, and pterygoid regions respectively. From the latter regions, the force which is partially dissipated over the bones of the cranium returns to the muscles of mastication, the base of the mandible, the mandibular trajectories, and the mandibular teeth, to complete the closed cycle.

The teeth, in order to maintain a state of functional equilibrium and to minimize shearing forces, align themselves in harmony with the trajectories of the jaws.

The moving of teeth by orthodontic mechanotherapy produces changes only in the alveolar bones and has no effect on the trajectorial system of the jaws, bones, or muscles—except when the teeth are so moved as to stretch or break trajectorial lines of stress; then the harmonious relationship between the muscles of mastication and the closed functional system is upset, thus inviting orthodontic relapse.

2. The literature is replete with the critical analysis of cases about orthodontic limitations, some of which are described below.

Lundstrum[7] critically analyzed one hundred and sixty-five cases which were chosen as permanent results because of the time they were out of retention. He showed when malocclueded teeth on a deficient apical base were orthodontically moved into a normal occlusion, the functional relationship of the latter produced no change in the deficient apical base. In fact the removal of the retainers resulted in a collapse of the treated cases. Lundstrum concluded that the treatment objective of any case, which is the optimum attainment of an occlusion must be "in harmony with the given or potential apical base."

Brodie and associates,[8] in a like manner, appraised cephalometrically finished Class I, Class II, and Class III cases to determine what changes were brought about by treatment. "The most startling finding was an apparent inability to alter anything beyond the alveolar process. The basic pattern was unaltered except for those changes which one might expect from growth."

Salzmann[5] also pointed out ". . . the size, form, and relationship of the basal arches are independent of the size of the teeth, tooth arrangement is greatly dependent on the size of the basal arches, on their relationship to each other, and, ultimately, on the distribution of the inherent lines of stress of the jaws."

Ballard,[9] in measuring the mesiodistal width of the teeth, found that teeth on one side do not have the same width as the corresponding ones on the opposite side. Real tooth symmetry is found in less than 10 per cent of the patients. Although we know there is bilateral symmetry in the human body, the degree of asymmetry varies in the individual.

Tweed[10] and Strang[11] believe that a malocclusion is in balance with its musculature and this balance must be preserved and not altered.

As a special case of perverted physiology, Dillon[12] reported a case of "anaesthesia throat" where the nerve supply to the uvula and velum palatum failed to produce the normal impulse to swallow or gag. The tongue during deglutition was forced between the anterior teeth, thus producing an open-bite. After successive retreatment of this case, it resulted in an orthodontic failure due to this perverted tongue habit.

Preis,[13] in his motion picture on habits, showed cases of macroglossia, pressure habits, thumb- and finger-sucking, nail biting, which had already created conditions that placed definite limitations on orthodontic treatment.

Where the malrelation of the jaws in a true Angle Class III case is so severe as to prevent correction by tooth positioning alone, surgical methods should be resorted to. This one can be accomplished either by ostectomy of both sides of the mandible or by resection of the ramus to reduce prognathism.

III. PRINCIPLES OF TOOTH MOVEMENT

A. *Basic Forces.*—Reaction in the periodontal membrane is of paramount importance in orthodontic tooth movement. The periodontal membrane suspends the erupted tooth in its socket, surrounds the surface of the root, forms the border of the alveolus, and supports the gingiva. The slightest[14] pressure on the tooth beyond the physiologic equilibrium incites the periodontal membrane to cellular activity to form and resorb alveolar bone and cause microscopic changes in the cementum. The periodontal membrane also possesses a sensory function of touch to the tooth. The oblique fibers of the periodontal membrane have their attachment higher on the alveolar bone than on the tooth. These fibers function as a suspensory ligament and counteract the vertical and horizontal stresses of occlusion.

Kronfeld[15] measured the thickness of the periodontal membrane of human teeth under various functional conditions. He concluded that the thickness of the periodontal membrane is three to four times wider in functioning teeth than in impacted teeth. The greater the vertical component of stress, the more uniform is the periodontal thickness. However, if the horizontal component of stress is greater, the periodontal membrane is thicker at the margin of the alveolus and apex and thinnest at the middle of the root.

Klein,[16] on the other hand, in his analysis found the average width of the periodontal membrane wider as the individual advanced in years.

Gottlieb and Orban[17] designated the term "physiologic" width to the wide periodontal membrane of a functioning tooth. "Biologic" width was applied to the thin periodontal membrane of an impacted tooth, or a tooth minus an occluding opponent.

In 1911 Oppenheim[18] experimented on monkeys and explained the histologic changes which took place in the tissues. The appliances used produced a tipping force on the lingual crown surface of the teeth and were activated for various definite periods of time. Histologically Oppenheim found that tension is produced by the stretched periodontal fibers on the lingual side

which changes the architecture of the bone. The new bone spicules are reformed parallel to the stretched periodontal fibers. Osteoblasts are found on the end of the bone spicules toward the periodontal membrane while osteoclasts are seen on the opposite end. The pressure side shows that the periodontal membrane and fibers are compressed. Osteoclasts are seen on the bone spicules facing the periodontal membrane and osteoblasts on the opposite end of the spicules. New bone or osteoid tissue is deposited on the lingual surface, while on the labial surface or pressure side of the osteoid tissue is deposited ahead of the tooth. In this manner the tooth can be moved in proportion to the amount of bone resorbed on the pressure side.

Strong forces cause the periodontal membrane on the pressure side to be crushed between the tooth and alveolar bone.[19] This results in thrombosis of the periodontal membrane. A damaged membrane fails to produce osteoclasts and since osteoclasts resorb bone, tooth movement ceases. The surface of the root also suffers injuries with eventual resorption of cementum and dentine. The tension side shows a tearing of the overstretched periodontal fibers with a ceasing of bone formation. The necrotic periodontal membrane and the resorbed areas of the root will repair, providing the force is not reactivated too often.

B. INTERMITTENT AND CONTINUOUS FORCES

With the appliances available at the present time, the orthodontist cannot possibly hope to produce the slowness of physiologic movement of the teeth. He should, however, try to approach the ideal to the best of his ability by avoiding the use of strong forces. *Where resistance is encountered it is imperative to increase the time of treatment rather than the force.* There are two forces that the orthodontist employs in his treatment: (a) intermittent and (b) continuous. Both have their place. Oppenheim[20] recommended the use of light intermittent forces. The stimulus is applied at night followed by a rest period of the same duration. The tooth movement obtained would be the closest to physiologic, since this would produce "an even superficial lacunar resorption in the direction of the desired movement." In this way no fulcrum is created with the result that no harmful deviation of the apex would occur.

Light continuous force would be preferable due to the minimizing of the osteoid tissue which is resistant to resorption provided that movement kept pace with bone resorption.

Aisenberg[21] pointed out that light continuous force is feasible for moving teeth a short distance, while light intermittent force is recommended to move teeth a greater distance because it enables bundle bone to become reconstructed with lamellated bone during the period of treatment.

Schwartz[22] stated that the most favorable treatment would be obtained if the forces used would not exceed the pressure of the blood capillaries.

IV. SYSTEMS OF APPLIANCES

A. TYPES OF APPLIANCES.—"No living organism is really a finished product, as long as it continues to live"[23] and this holds true of the science of

orthodontics. As long as there are progressive orthodontists, there will be differences of opinion, especially when it comes to "systems" of appliances. Perhaps too much emphasis has been placed on "systems" instead of case analysis, yet this should not be the stumbling block that will preclude the orthodontists from facing their problems jointly. Postgraduate students or preceptors would naturally be trained in the "system" which the University or orthodontist is partial to. It is understandable therefore that partialities are easily developed as to the "superiority" of one system over another. In the final analysis there is no essential difference between appliances, so long as each one can produce the best possible result for the specific case. On the other hand, if our case analysis calls for a specific appliance to execute certain movements of teeth, then it is obligatory for the orthodontist to use or learn to use this instrument, so as to produce the best possible results. There is no one appliance that is able to correct all the various manifestations of malocclusion. Each appliance, like our individual patients, has its limitations and, therefore, it should be fitted to the case and not the case to the appliance. Each "system" can readily produce strong and undesirable forces and not one of them can produce a light force that can be called physiologic. Each "system" has shown well-corrected cases of malocclusion because their appliances were only an adjunct to the correct case analysis, based on the proper understanding of growth and development.

The individual cases of malocclusion present specific problems, and therefore every case should be analyzed so that the execution of the treatment would utilize the best appliance or a combination of appliances.[16, 24] Or, as Eby[25] aptly stated, "Treatment should be approached as a prescribed measure and the best operator in any field is the one who has the knowledge and skill to do the least he can at the right time."

The Johnson appliance is a good example of simplicity of a mechanism that can be easily adjusted in the mouth. It is used in conjunction with other appliances, usually with the lingual arch. The author often uses it in combination with a lower edgewise set-up, especially where stronger anchorage is required and where the curve of Spee is excessive. Johnson was the first to utilize measured continuous forces in an attempt to approach the physiologic movement of teeth. He showed that the lower anchorage will be re-enforced when, in the initial stages of treatment, the upper anterior teeth are retracted against the lower mandibular incisors. By properly timing the use of coil springs in combination with Class II elastics, he obtained distal movement of the upper buccal segments to correct the anteroposterior relationship. The technique is less exacting than that of a full multibanded one, with the result that a greater number of patients can obtain good orthodontic treatment. Johnson,[26] Waugh,[27] Eby,[28] Barber,[29] and Madden[30] showed excellently treated cases with stable results.

Occipital anchorage is a useful adjunct in the treatment of many types of malocclusion. Although it was used by many operators like Case, Angle, and Oppenheim, the profession at that time did not take advantage of this instru-

ment. As a result of this, slippage of anchorage occurred in many cases which ended in relapse and bimaxillary protrusion. Tweed[31] was one of the few who recognized the importance of a headcap in re-enforcing the anchorage, so as to gain better control of those teeth he did not want to move.

The headcap can be advantageously used in cases where the orthodontist feels that the lower jaw does not require orthodontic interference. It is a known fact that the application of Class II elastics or the use of separating wires for the construction of bands could readily upset the mesiodistal relationship, so as to create a malposition of these teeth. Fisher,[32] Kloehn,[33] and Nelson[34] reported and showed successfully treated cases of mixed dentition and Class II, Division 1, cases where the lower jaw was not disturbed.

Oppenheim[20] in his recent article on the "Possibility for Physiologic Orthodontic Movement" advocated the use of the headcap because "Use of a stimulus for a short time (one day or one night only) followed by an intermission of the same duration or even of two or three days; *a new stimulus should not be applied as long as the primary osteoclasts mobilized by the preceding stimulus are at work.*" The treatment might be longer, but the patient does not feel pain nor do the teeth become loosened.

Mershon[35] designed the removable lingual arch with the idea that it would cause no restrictions or interfere with the inherent growth of the jaws. This appliance utilizes a minimum number of bands and delicate gold spring wires can be soldered to the arch wire for effecting specific tooth movements. The lingual arch can be used alone or in combination with a Johnson, labial, or edgewise appliance.

The edgewise appliance is the most popular of the multibanded techniques. Although this is an exacting appliance I find it to be one of the best mechanisms, especially in the treatment of extraction cases. In these cases a more stable anchorage can be established and maintained and better control is gained of all types of tooth crown and root movements. Some of the most beautifully corrected results have been shown with this mechanism by Tweed,[10] Strang,[36] and Bull.[37]

The sectional arch wire technique can be employed successfully with the edgewise mechanism. Bull[36] demonstrated the most efficient partial arch wire, and, when used according to his prescription, it brings excellent results. It has to be inserted passively and the loop activated lightly. While there are many efficient retracting loops, the Bull's loop is superior to others, because it can be controlled in horizontal and vertical planes. Sectionals should also be used where complete bracket engagement is impossible or inadvisable to effect, because of crowded anterior teeth.

This edgewise appliance can be used in conjunction with the twin wire, heavy labial, and lingual arch.

Removable appliances have their place in orthodontic treatment, and where indicated have proved to be extremely helpful: (a) as an aid in moving teeth, (b) as a stabilizer, (c) as an adjunct to other appliances to facilitate the positioning of teeth, (d) as a means of opening the bite.

Paul Lewis,[38] in his article "Space Closure in Extraction Cases," described the use of the bite plate in moving the maxillary cuspids distally, while the posterior teeth are securely held by it to prevent them from tipping and moving mesially. In this manner the distal movement of the cuspids is obtained without banding any or all of the maxillary teeth.

Carey[39] also found the bite plate useful in conjunction with the edgewise appliance. While obtaining distal movement of the posterior segments of the mandibular arch, he employs a stabilizing plate in the maxillary denture. When this is accomplished, he reverses his procedure by using a stabilizer to re-enforce the mandibular anchorage to move the upper lateral segments distally.

Moyers and Higley[40] developed a removable acrylic lingual plate for the purpose of re-enforcing anchorage. This mechanism can also be used in combination with any labial appliance. It employs a lingual lock in the molar region which prevents its removal by the patient.

Simple removable appliances employing inclined planes are especially effective in correcting anterior or premolar teeth which are in a cross-bite position.

Jackson, Crozat, and many others demonstrated excellent results in many of their cases where they used different types of removable appliances. Active forces can be employed with these appliances to obtain changes in the occlusion of the teeth and the relationship of the jaws.

The Kesling positioner, when used judiciously, is an efficient means in obtaining the closure of spaces and slight rotations of teeth. It should be used only in the final stages of treatment where minor esthetic corrections may be expeditiously gained.

The Anderson removable appliance (Norwegian system) is worn loosely in the mouth. In order to keep this appliance in place, the patient must use his tongue, lips, muscles, and teeth. "Thus this type of appliance acts as a passive transmitter to the teeth and alveolar processes which are in contact with it."[16]

SUMMARY

1. Variations in genetic endowment and in environmental factors account for individual differences.

2. No operator can hope to produce the slowness of physiologic tooth movement with the appliances available at the present time. He should try to approach the ideal to the best of his ability by avoiding the use of strong forces.

3. The periodontal membrane is not partial to any particular "system" of appliances. It reacts to pressure which disturbs the physiologic equilibrium, bringing about a change in tooth position.

4. Every case of malocclusion presents specific problems. Each case should be analyzed and the appliances or combination of appliances deemed suitable should be prescribed for the execution of treatment. Orthodontic treatment is handicapped and doomed to failure when "appliance system" is allowed to take precedence over basic principles.

The required cases submitted to the American Board of Orthodontics have been completed with different individual appliances or combination of appliances.

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36 West 59th St.

THE ETIOLOGY OF THE PERVERTED SWALLOWING HABIT

WALTER J. STRAUB, D.D.S., M.S., SAN FRANCISCO, CALIF.

THE everyday observation of the orthodontist into the etiology of malocclusion has caused the desire to investigate more thoroughly the cause of the perverted swallowing habit. It is strange that very little appears in the literature regarding a habit that occurs with such frequency and causes such severe malocclusions. However, Truesdell and Truesdell[1] in 1937 advanced several theories on the cause of the perverted swallowing habit, although nothing has been published statistically to substantiate any theories on the cause of it. However, the literature is quite comprehensive on the act of deglutition. The word "deglutition" is derived from the Latin words *deglutitio and deglutire,* to swallow down, and is defined as the act of swallowing. It may occur during the ingestion of foods, either solid or liquid, or at periodic intervals throughout the day.

The purpose of this study is to survey the principal papers in relation to tongue habits and the cause of the perverted swallowing habit.

In order to understand the deviations from the normal, a thorough knowledge of the act of deglutition should be had and the following descriptions are generally accepted. Individuals whose teeth are in good or fairly close to normal occlusions close their teeth firmly in centric as the first step. The next action is the depression of the tip of the tongue and then placing the tongue in the palate well back in the mouth with the tip placed at the posterior part of the rugae. The tongue pressure is exerted backward and upward, the tip of the tongue in position and moving slightly distally. Naffziger, Davis, and Bell[2] stated: "The soft palate closes off the nasopharynx, the larynx rises and the opening is covered by the epiglottis as the material passes into the upper portion of the esophagus." Then deglutition may conveniently be divided into three stages. The first stage is both voluntary and conscious, during which the food is gathered into a bolus and carried into the isthmus of the fauces. The second stage is involuntary but still conscious, and may be considered a reflex mechanism, and the bolus or saliva is carried through the oral and laryngeal portions of the pharynx during this stage. The third stage is both involuntary and unconscious and the bolus or saliva is carried through the esophagus into the stomach. The Truesdells[1] gave a very good description of the act of deglutition:

"The muscles of mastication are brought into play in bringing the jaws tightly together and holding them there during the entire process. Thus the tongue has a firm boxing around it against which it can press and gain mechanical advantage in forcing the bolus distally."

The tongue raises the saliva or bolus of food and in its proper position has a complete boxing around it and obtains mechanical advantage with which to

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force the bolus, liquids, or saliva in the proper direction. From here the musculature used in swallowing is well described by Truesdell[1] and will not be repeated. The four openings to be closed in the act of deglutition are nasopharynx, the two internal auditory tubes, and the glottis. This also forms an additional aid in normal swallowing of a sucking action which, in addition to the pressure of the tongue, forces the liquids distally, although some people swallow with or without the sucking pressure. By the closure of the four openings and the sucking pressure, liquids can be swallowed upward, which is sometimes demonstrated in circus and side shows, such as contortionists, without the liquid running out of the nose or escaping its distal pressure.

In 1880 Kronecker and Falk[3] suggested that fluids and semifluids were projected by contraction of the muscles of the mouth (the mylohyoids) before the contraction of the pharyngeal and esophageal musculature occurred, and that this occurred later after the bulk of the bolus had passed and served to sweep along the remaining particles. Kronecker reported that at the beginning of deglutition there was a rapid rise of manometric pressure to 20 cm. of water in the posterior mouth, pharynx, and upper esophagus.

By means of roentgen-ray studies Cannon[4] in 1898 and 1900 came to the same conclusion in agreement with Kronecker and Meltzer that in the human being fluids were shot directly down to the cardia, mainly by the action of the mylohyoids and not by peristalsis, but that the swallowing of solids and semisolids was a slower peristaltic-like process. Cannon[4] described human swallowing of a solid bolus thus:

> When the food is sufficiently masticated it is gathered in a depression on the dorsum of the tongue. The tip and lateral aspects of the tongue press against the hard palate and teeth to prevent escape of the food particles forward and laterally to the mouth and cheeks. Respiration is reflexly suspended. The tongue is pressed upward and backward by contractions of the mylohyoid and hyoglossus respectively. The tongue thus acting as a piston drives the bolus first against the downward wall, sloping soft palate then on between this pharyngeal wall and the posterior surface of the upright epiglottis, the tip of which lies in contact with the base of the tongue. During this phase the action of the palato-pharyngeus muscles has thrown the pharynx into a narrow cleft and against this opening the soft palate is pulled by contraction of levator palati, thus blocking entrance of the bolus into the nasal chambers. Thus far the esophageal opening has remained closed mainly by pressure of the larynx against it. With the rise of the hyoid and larynx the esophagus opens. The epiglottis is pressed back until it shuts the laryngeal aperture. Then presumably the tip of the epiglottis slips downward along the posterior pharyngeal wall, pushing the bolus probably with a final quick impulse into the gullet.

Whether or not the action of the epiglottis is a factor in pushing the bolus is a point that was disputed as far back as 1892. Stuart Mosher[6] in 1927 published studies from which he concluded that the epiglottis acts as a cover for the larynx during swallowing.

Mosher[6] stated:

> In swallowing the first movement of the tongue is the depression of the tip. This makes a pocket between the tip of the tongue and the back of the teeth. In this the saliva or barium used in the experiment first accumulates. Next the dorsum of the tongue is hollowed out slightly and the barium flows into this depression. Then the tip of the

tongue is carried to the roof of the mouth against its teeth and is held there from now on, thus preventing the barium escaping forward. As the tip of the tongue comes up the base of the tongue is depressed. In the next stage the base is depressed still more, the anterior half of the tongue however goes to the roof of the mouth. The barium is now caught between the base of the tongue, the anterior half of the body of the tongue and the posterior pharyngeal wall. At this point the base of the tongue is seen to dart backward like the plunger of a piston and the barium is shot downward.

Barclay[7] stated that "time of swallowing is less than half a second with solids and probably less than one-fourth second with thin watery food.

"In swallowing we feel that the nasal cavity is suddenly automatically cut off and we note the change of pressure in the Eustachian tubes and that in swallowing the nasopharynx is completely emptied of air for a fraction of a second before we swallow, creating a suction that helps to slide the food down the esophagus after the tongue has thrown it into the pharynx and upper part of the esophagus.

"The act of swallowing must usually be accomplished by negative pressure. In my own case swallowing dry but masticated bread it amounted to 18 inches of water. The high negative pressure only lasted for about 1/8 of a second but even so it was sufficient to carry the bolus from the back of the tongue to the level of the clavicle."

Best and Taylor[9]: "As a result of the muscular movements, chiefly on the mylohyoids a pressure of 20 cm. of water is developed in the posterior part of the mouth pharynx and upper part of the esophagus. . . . A negative pressure, however, exists in the anterior part of the mouth. A negative pressure also normally exists in the closed mouth at other times which aids in holding the lower jaw in the elevated position."

When the food is in the esophagus a negative pressure amounting to 35 cm. H_2O or more is created in the pharynx and esophagus, thus aiding in the descent of the bolus.

DESCRIPTION OF MATERIAL AND PROCEDURE

In discussing the perverted swallowing habit with a child's mother, in relation to one of her children, she expounded the theory that she thought the cause of her own child's perverted swallowing was bottle feeding. Her reasons and descriptions sounded so plausible that I, who had been gathering material on interference or pressure habits, decided to survey and keep a record of all patients coming into my office with the perverted swallowing habit.

In a period from June of 1943 to the time of writing, December, 1950, 237 patients presented themselves with perverted swallowing habits. A careful case history was taken on every patient presenting himself for orthodontic diagnosis. The general health, diseases to date, the recurrent attacks of such things as colds and allergy were all noted. Then the oral, orthodontic, or interference habits of the individual were noted. In most of these cases it was not necessary to ask the patient to swallow, as either the position of the teeth indicating the positioning of the tongue, or the patient would swallow involuntarily during the examination and the perversion noted as present.

In many cases, one or more habits would be present with the perversion. For example, thumb-sucking and a perverted swallowing habit would be present, or all the other habits that orthodontists are familiar with, such as leaning, lip biting, tongue thrusting, fingernail biting, sleeping habits, and pencil biting. The parents of children with perverted swallowing habits were interrogated as to the type of infant feeding, the length of time on liquid diet, and the correlation between infected tonsils, respiratory infections, allergies, duration of colds (Straub[10]), and correlation between endocrine disturbances and psychiatric problems.

TABLE I

		MALE	FEMALE	BOTTLE FED	BREAST FED	SUPPLEMENTAL FEEDING TWO TO THREE WEEKS
Total No. of patients	237	96	141	221	0	16
Age range 2-32						
Over 21 years of age	6					
Over 14 years of age	22					
Under 14 years of age	209					
Perverted swallowers with no contributing habits	107	43	64			6
Perverted swallowers with thumb- and finger-sucking	73	32	41			2
Perverted swallowers with all other habits	57	21	36			8

Table I shows the total number of perverted swallowers. It is interesting to note that only 16 had supplemental feeding and then for a short time only, and of these, only 6 had perverted swallowing habits without any other interference habits. The greatest percentage, 209, was 14 years or under.

In the observation of the act of deglutition there is not any change in the muscles of expression, and any observation of these muscles changing, just prior or during the act, usually indicates a perverted swallowing habit. However, as noted, the muscles of mastication are used in bringing the teeth and jaws tightly together and holding them during the entire process.

THE DESCRIPTION OF THE PERVERTED ACT OF SWALLOWING

In the perverted swallowing habit, the muscles of mastication are not used in bringing the jaws tightly together. First, the tongue is thrust forward between the teeth, and then the muscles of mastication bring the jaws together until the upper and lower teeth contact the tongue. In most cases only the tip of the tongue is involved with only an open-bite in the incisor and cuspid region. In others, the sides as well as the tip of the tongue are placed between the teeth, opening the teeth in the premolar region as well as the anterior teeth. The orbicularis oris and other facial muscles of expression enter into the act by tensing as if to help force the bolus back with the tongue. In many cases the patient blows air forward and builds up a positive pressure in the anterior part instead of a negative pressure. A wave of contraction starts with the facial

muscles, the tongue being held between the teeth, with a contraction of the muscles of the throat such as the palatoglossis, palatostyloglossis, and the mylohyoid. In addition to the contraction of these muscles, the patient also has a tendency to move his head forward during the first stage of deglutition as if to help roll the bolus or saliva backward. The act of deglutition takes place approximately one or two times a minute during the waking hours and approximately once a minute or less depending upon each individual's flow of saliva during the sleeping hours. The normal swallowing habit closes off, temporarily, the nasopharynx, the Eustachian tubes, the larynx from the pharynx, while the bolus of food is passing it. As previously described, this causes a partial vacuum which helps to drain part of the nasopharynx, part of the Eustachian tube, and also relaxes the muscles after the act. In the perversion, the reverse is true. The patient does not cause a complex vacuum but has a tendency to blow the remaining air against the openings, such as the lips, Eustachian tubes, and nasopharynx. In the perverted swallowing habit, the contraction is so intense that the patients have a strained musculature about the face and throat, whereas the normal act of deglutition is a very relaxing episode.

RESULTS

Of the 237 patients with the perverted swallowing habit examined, all of them without exception were bottle-fed babies. Sixteen were patients who were supplemental feeders for two or three weeks, who were put on the breast and bottle fed at the same time, for a period of two or three days to two or three weeks, when they were left solely on the bottle. A great many of these patients had affected the anterior segments of both arches. Either they had a severe so-called "open-bite" to a protrusion of the upper anterior teeth, or the anterior segments of both arches would be in a protruded position with spaces between the incisors and cuspids. Many of them, in addition, were thumb-suckers and had an extreme protrusion of their upper anterior teeth with little room to accommodate the tongue in its proper position in the palate, and instead it was found resting on the lower teeth. In fact in many of these cases the palate was so narrow and ill-formed that even if the patient wanted to put his tongue against the roof of the mouth it would not fit. The tongue would be too wide to fit flat against the palate.

As a result of the perverted swallowing habit we usually find a narrow upper arch and in a great many cases a severely contracted maxilla with protruding upper teeth in open-bite relationship. In other cases the maxilla is so badly contracted that either one or both sides are in cross-bite relationship. The importance of the proper position of the tongue against the palate with its boxing of teeth in the act of deglutition cannot be overstressed as it maintains the balance of forces to maintain proper arch width in the maxilla. In the perverted swallowing habit the opposite takes place and becomes very difficult to correct.

The perverted swallowing habit has been found by our investigation to be definitely due to improper bottle feeding.

In order to appreciate why bottle feeding can cause the perverted swallowing habit, a description of the differences of the mechanics of bottle feeding and breast feeding should be explained.

In breast feeding, the baby, in addition to his sucking at the breast, is pressing against the breast with his nose, cheek, and lips with the teat between his lips and gum pads so that there is a combination of pressure against the breast, a squeeze and a suck on the teat, and the tongue is free in the mouth to place itself properly to take care of the normal act of deglutition as the milk does not run freely but must be sucked out with pressure. When a mouthful is obtained the source of supply is shut off and the baby uses normal tongue action as described in the act of deglutition to throw the milk into the back of the pharynx.

In bottle feeding the nipple is very long and usually the parent wants to be sure that the child gets sufficient milk or the entire formula, without any effort on his or her part. To facilitate this procedure, there are usually several large holes placed in the nipple. There is no pressure used in bottle sucking and in order to prevent himself from choking from excess milk, the child's tongue is thrust forward with the tip between the gum pads and the nipple allowed to rest between the tip of the tongue and the upper gum pad and lip. The milk literally flows down his throat in the trough of the tongue, in which position he swallows. When the child attempts to suck vigorously, the milk comes so fast that he chokes before he can swallow properly or the parent has to remove the bottle from his mouth until he can either swallow the excess or it flows out at the corners of his mouth. The psychiatric problem of the baby nursing at the bottle should also be taken into consideration. Levy[11] stated, "Previous observation and clinical studies have demonstrated that the primary cause of thumb and finger sucking is insufficient sucking at the breast or bottle. In youngsters who suck after bottle feeding the nipple was replaced with one having one small hole increasing the sucking time to 25 minutes, which exhausts the sucking urge and the finger did not go to the mouth after feeding." Improper bottle feeding, in addition to causing the perverted swallowing habit, may help to cause finger- or thumb-sucking habits. If the child is fed from the bottle, he should be held by the mother so that he gets the love and affection and the warmth and soft feeling of the mother's body, and he should be made to suck and work for his food. The cold, scientific way of feeding, by placing the baby in his crib and using a chrome-plated bottle holder, or on his side, with the bottle resting on a pillow, soon teaches the baby to shove his tongue forward, maintain the tip in that position, and swallow the back portion of the milk with the perversion, while the tip is receiving a new supply of milk.

The love, care, and affection of the mother in nursing the newborn child at the breast should be copied as much as possible in bottle feeding. Interrogating mothers who have raised children in different age bracket groups where the older child was raised according to the old formula of feeding every four hours with a mechanical feeder, or the child lying in the crib with a bottle resting on the pillow as recommended in the past, and the younger children with the newer

concept of nursing with the bottle with the proper nipple and hole, where the child is cuddled, loved, fondled, and given his bottle when he cries for it instead of on certain hours, has brought out the following points. The mother is much happier, the child is better adjusted with a better nervous system and better feeling of security and well-being. Time will tell whether the perverted swallowing habit can be prevented by this method. A new nipple by Walter H. Griesinger,[12] of Portland, Ore., has many features which may help to correct this perversion.

COMMENT AND CONCLUSION

Methods for the correction of the perverted swallowing habit are described in the literature and there are several methods used in its correction.

However, may I caution that unless the operator is somewhat familiar with the perverted swallowing habit, the habit will be overlooked in diagnosing the case, and, when nearing completion, the operator will imagine that the patient has developed a perverted swallowing habit due to the new position of the teeth, and will instigate treatment to close up the anterior teeth, when, in reality, the habit had always been present, and, perhaps due to other habits, such as the leaning habit, the open-bite did not develop.

1. The perverted swallowing habit seems to be the direct result from improper bottle feeding.

2. The so-called open-bite is not always an indication of the perverted swallowing habit as other habits such as leaning habits may so affect the denture that they may disguise its presence and be present in a typical Class II, Division 1 with quite an overbite and overjet.

3. It may be present in tongue thrusters where they have pushed both upper and lower anterior teeth labially, creating spaces and in some cases an edge-to-edge bite.

4. The perverted swallowing habit may separate not only the anterior teeth but also most of the posterior teeth, including the premolars and in rare instances the first molar unilaterally.

5. In many perverted swallowers the palate is so high and narrow that the child cannot place his or her tongue in its correct position due to its size, even if the child wished to, until proper corrections have been made.

6. It may be present with other interference habits such as thumb- or finger-sucking, lip biting, tongue thrusting, nail biting, and leaning habits.

7. It seems to be more prevalent in the female than the male, but this should be discounted as parents may be more concerned with slight irregularities in their daughters' rather than their sons' teeth.

8. The perverted swallowing habit and tongue thrusting may be aided by unusually large tongues causing severe open-bite cases.

9. The perverted swallowing habit usually causes open-bite cases and if not corrected causes the anterior segments to relapse to their former position after the completion of orthodontic treatment.

10. It was found by complete examination that the tongue plays an important part as an interference habit with the normal growth of the dentition and is capable of causing many of our serious malocclusions.

11. The perverted swallowing habit should be detected and corrected early to facilitate normal development of the palate and dentitions. In its early detection it should be corrected immediately with a mechanical appliance to limit the tongue to its proper position. It is a very difficult habit to correct in older patients and there is some danger that after fourteen to sixteen years of swallowing incorrectly they may return to the old perverted swallowing habit after all appliances have been removed.

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450 Sutter St.

REHABILITATION OF THE CLEFT PALATE PATIENT

WILLIAM G. HOUGHTON, D.D.S., WATERTOWN, N. Y.

INTRODUCTION AND BACKGROUND

THAT most unfortunate individual, the cleft palate patient, may be found in every community. It is a regrettable fact that in quite a percentage of cases very little is being done toward rendering aid to these physically handicapped persons by giving them proper surgical care, specialized prosthetic equipment, and expert speech therapy. It is only by the careful correlation of these specialists and their successive services that the cleft palate child is equipped to make the social adjustments necessitated by his handicap.

Once in every 770 live births, there appears a child with a cleft (hare) lip, a cleft palate, or some combination of both (Slaughter and Brodie). Based on these statistics it would be reasonable to assume that cleft palate may be considered the most frequently found congenital deformity existing today. In the normal progeny of this world many thousands of parents await the arrival of a child. Imagine their emotion of despair and disappointment when they first discover that the little one has a deep slit running vertically up through the lip to a twisted and flattened nose. The understanding physician can do much to dispel this shocking reaction. The mother and father are told that their infant has a cleft palate but that he is not an idiot. In fact, they may be assured that there is no basis for the association of cleft palate with mental deficiency. They may be encouraged by information on other children, similarly born, who, through the advantages of modern science, have been restored to a normal social environment.

In many cases the nature of this deformity with its marked facial distortions and faulty speech has a most unfavorable psychologic effect on the child. Even at an early age he has discovered that he does not look or talk as his brothers and sisters or the children next door. Although most children who have a cleft palate develop an inferiority complex, their personality pattern may be quite different. In the classroom at school they soon discover that it is easier to avoid answering questions, as their unintelligible speech only attracts attention. For this reason they are likely to be classified as stupid and backward pupils. In connection with the foregoing, I should like to quote a letter which came recently and rather clearly illustrates the mental frustration of these people:

> Dear Sir:
>
> I am very interested in knowing a little about cleft palate. I have a cleft palate and I would like to know if anything can be done about it. I am nearly nineteen years old and because it is hard for people to understand what I say and I have to repeat so much that I talk very little to anyone. At my age it seems almost unbearable. Please let me know what you think about it, as this is very important to me.
>
> Yours truly,

In 1885, Truman W. Brophy, after extensive study, decided that it is best to close a cleft in a healthy child as soon after birth as it is possible to operate.

He based his reasoning on the fact that later in life the maxillary bony structures become more ossified and, as a result, surgical closure would be more difficult. From that time onward, the Brophy method with some modifications became the accepted technique employed by most surgeons. However, quite often this early surgery was unnecessarily radical and apparently the operator had but one thought in mind, to close the cleft. In rural communities, an abdominal surgeon was generally employed, and the results of the operation were rather horrifying from an esthetic as well as a speech impairment standpoint. Usually, there were many operations, each one building up more scar tissue in the roof of the mouth and adding to the thickness and immobility of the soft palate. No thought or consideration was paid to occlusion of the dentures, thus resulting in a dental mechanism of the poorest functional quality. It has been my experience to observe some of these cases during the past few years.

Dr. Wayne B. Slaughter and Dr. Allan G. Brodie recently published an article "Facial Clefts and Their Surgical Management in View of Recent Research." By applying research studies of growth and development of the human cranium and face from early childhood, these men recorded a new concept of early surgery for the cleft palate patient. The studies of Dr. Slaughter and Dr. Brodie reveal that the activity of certain normal growth sites in the development of the face is a highly important consideration and that these same growth sites respond similarly in congenital deformities. They found in comparing operated and nonoperated cases that there was strong evidence that surgical interference of certain growth sites in the maxillary area tends to inhibit facial development.

The inferences arrived at by Dr. Slaughter and Dr. Brodie were as follows:

> If conclusions based on the above investigations are valid they impose certain conditions on surgical procedures involved in the cleft palate and cleft lip correction. These findings strongly suggest that there must be no unwarranted trauma to soft tissues and no interference with its blood supply. Any fracturing of bone or stripping of periostium in the effort to gain approximation is to be avoided if permanent damage to growth sites is not to result.

In too many instances surgery alone has been considered as the beginning and the end of cleft palate therapy. There is no question that surgery plays an important role, but without an intelligent understanding of other related problems, the case that appears from an anatomic standpoint to be a surgical success may result in a functional failure.

Cleft palate cases fall into the following definite categories:

1. The completely successful operative case in which the cleft was successfully closed and normal function of the soft palate restored.
2. The partially successful operative case in which the hard palate may be closed, but in which soft palate function was impaired causing defective speech.
3. Natural clefts, either complete or partial, which for some reason or other were never operated on at all.
4. Those individuals in whom may be present an abnormally short soft palate, resulting in a poor anatomical relationship between the soft palate and the pharynx, thus causing defective speech.

CASE REPORTS

The following case reports have been chosen because each one exhibits its own basic clinical problem. Each individual presents a different solution to the complex psychologic adjustment that is always associated with cleft palate deformity. In describing these cases I will endeavor to offer histories, surgical and orthodontic treatment procedures, and the planning, development, and use of the required speech appliance. I should also like to tell a bit about these people and how rehabilitation has affected their individual lives.

Fig. 1.—Case 1. Before treatment.

Fig. 2.—Case 1. After treatment.

CASE 1.—The school nurse discovered this boy when he was a senior in one of the neighboring public high schools. He was then 18 years old, and the fact that he had fought his way up to this point would indicate a background of determination, perseverance, and average mentality. He lived on a farm with his parents and six other children, all of whom were physically normal.

At the first appointment, full-mouth x-rays, profile and full-face photographs, and impressions for study casts were taken. History revealed an etio-

logical factor of complete cleft of the lip and hard and soft palates on the left side. Early surgery had been instituted resulting in an excellent lip repair and complete approximation of the cleft, although the operation had caused a thick layer of scar tissue over the hard palate.

Fig. 3 reveals how surgical closure had shortened and immobilized the soft palate, making it practically useless as a part of the speech mechanism.

Fig. 3.

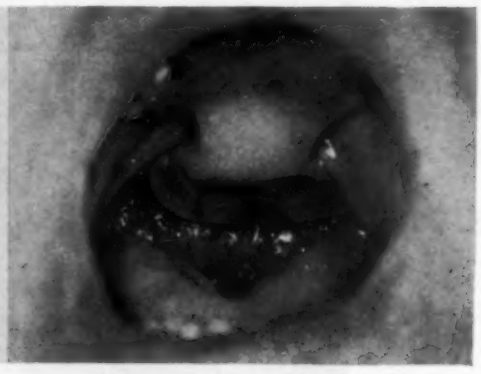


Fig. 4.

Fig. 3.—Case 1. Short immobile soft palate.
Fig. 4.—Case 1. Speech appliance inserted.

Fig. 5.

Fig. 6.

Fig. 5.—Case 1. Intraoral view of patient prepared for appliance.
Fig. 6.—Case 1. Appliance inserted.

In the maxillary denture, examination disclosed absence of the following teeth: left first and second premolars, left second and third molars, right second premolars, and right third molar. It could not be learned whether these teeth were congenitally absent or whether they were lost as a result of the operation. The left cuspid and the right first and second molars were impacted. The mandibular denture was large and protrusive. The right second molar was impacted with no indication of third molars being present on either side.

As in most cleft palate cases the malocclusion was Angle Class III classification with the right cuspid and first premolar in lingual oversion.

The upper lip, firmly attached to the premaxilla by heavy fibrous tissue, was stiff and immovable, and precluded the successful construction of a denture.

The patient's speech was characteristically nasal, and it was difficult to carry on a conversation without constantly asking him to repeat.

A consultation was held with the speech teacher which consummated in a long-range program of rehabilitation for this boy. This plan was proposed to the parents and their son for consideration; and it seemed, for the first time in his 18 years of existence, there was some hope for a brighter future. However, the father was inclined to feel that six weeks in the summer speech clinic would interfere with the farm work. Psychologically the patient was well prepared, for already he had shown a rare ability to overcome obstacles.

In proper sequence the dental operations, extractions, and plastic surgery on the lip attachment were completed.

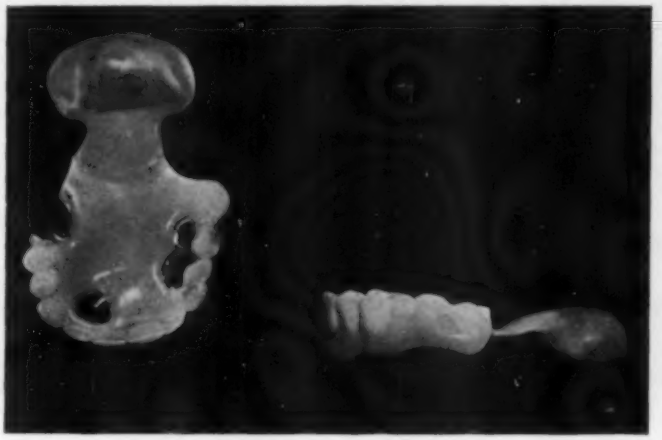


Fig. 7.—Case 1. Horizontal and lateral view of appliances.

Due to the extreme narrowness and lack of development of the upper jaw, it seemed unwise to consider orthodontics in this case. Also, there was a time factor, as we were anxious to have him ready for the speech clinic for the summer session. In planning the speech appliance, it was decided, for esthetic and functional reasons, to construct a complete acrylic denture to articulate with the lower teeth. All teeth in the upper jaw were removed except the right cuspid, first premolar, central incisor, and the left first molar, which furnished excellent four-point retention.

This rehabilitating program was started in January, 1948, and the speech appliance was inserted two days before the summer speech clinic opened in July of the same year.

It was my pleasure to interview this young man recently, at which time many of the acompanying photographs were taken. I am pleased to report on the marvelous social adjustment that he has made. He is a sophomore in an agricultural college and is getting A and B grades in all of his academic assignments. In extracurricular activities he is a member of a fraternity and a star on the varsity basketball team. His hobbies are photography and athletics.

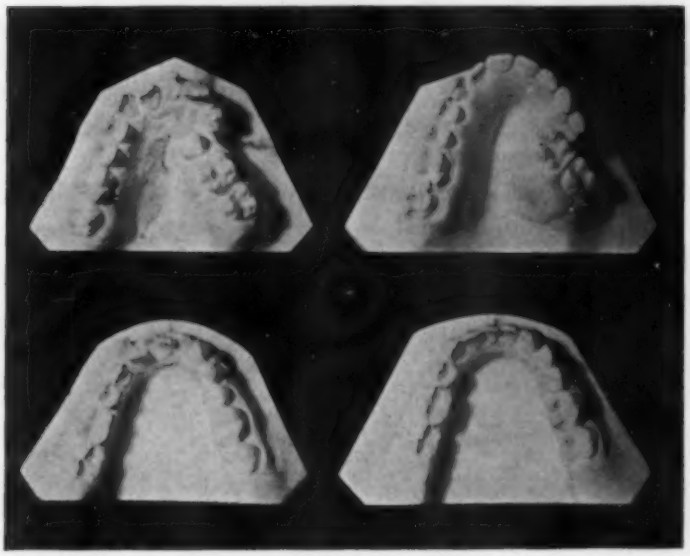
This individual talks very well, and he advised me that few people realize he ever had a speech problem.

CASE 2.—This is a report about a 14-year-old girl who was referred to me by the county superintendent of child welfare. She was of unknown parentage, although her name and general characteristics were suggestive of French origin. The lip showed a vertical scar running up to the left nostril with a V-shaped groove in the vermilion border. The hard palate had been successfully closed, but there still remained a wide passage from the vestibule to the nasal floor. The soft palate had not been unduly shortened by the operation, and the patient was able to execute functional closure for normal voice qualities. She talked with a slight impediment, but this was improved by the speech teacher after a denture had been inserted.

Fig. 8.—Case 2. Before treatment.

Fig. 9.—Case 2. After treatment.

Fig. 10 demonstrates the complicated malocclusion created by early surgical procedures. However, the excellent occlusal relationship of the right buccal segments reduced the problem considerably. This patient was under orthodontic



A. *B.*

Fig. 10.—Case 2. *A*, Before treatment; *B*, after treatment.

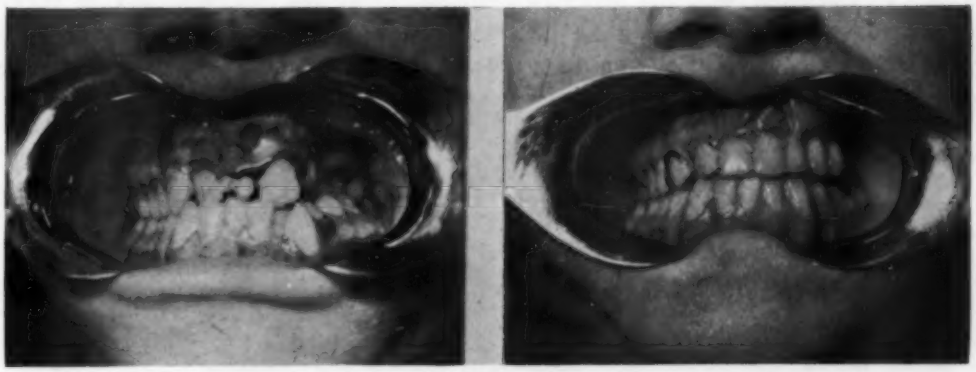


Fig. 11. Fig. 12.

Fig. 11.—Case 2. Before treatment and extractions.
Fig. 12.—Case 2. After treatment and denture insertion.

Fig. 13.—Case 2. Lateral and horizontal view of denture.

care for fourteen months, the greater part of the treatment being confined to the mandibular denture. The lower left lateral incisor and first premolar were removed, after which the cuspid was brought into alignment; then the spaces were closed. Other than jumping the right lateral incisor over the bite, no orthodontic treatment was attempted in the maxillary denture. The two central incisors, left lateral incisor, cuspid, and premolar were extracted, and an acrylic denture constructed to round out the arch and fill in the deep cavity in the alveolar process. A study of the accompanying photographs should be convincing evidence that this was a reasonable solution.

This girl made a marvelous personality adjustment. She has developed from a joyless, beaten-down individual to a happy, self-directed person, with real interest and ambition. She is now living in a private home and doing good work as a junior in high school.

CASE 3.—This report is of a man, aged 27, who had a complete cleft of the soft palate that had never been operated upon. This type of cleft is rather rare; and although there were no disfiuring characteristics, the speech faculty was as defective as that of the total cleft person. My first contact was by long distance telephone when he called to explain his difficulty and arrange for an appointment. I remember well his inarticulate and frustrated conversation in trying to make me understand. Our first meeting was somewhat of a paradox, for it was hard to realize that a seemingly normal person could possess that kind of voice.

Fig. 14.—Case 3. Note normal facial features.

The initial interview was held in April, 1948, in consultation with the speech teacher. We decided to construct a speech appliance, and arrangements were made for his attendance at the summer speech clinic. History disclosed that the patient's brother possessed the same identical cleft and had been wearing a speech appliance for some years with considerable success.

The occlusion was normal although the upper denture had suffered mutilation by the loss of the left second premolar, first and second molar. This, in a way, gave an added advantage for four-point retention of the prosthesis.

The first two or three weeks he seemed to make very little progress at the speech clinic. Then one day he came into the office whistling a tune. For the first time in his life he was able to whistle, and I knew at once that he had "gotten the hang" of blocking off the air stream. At the end of the six-week training period, he had completely mastered his speaking problem, and a new world had opened to him.

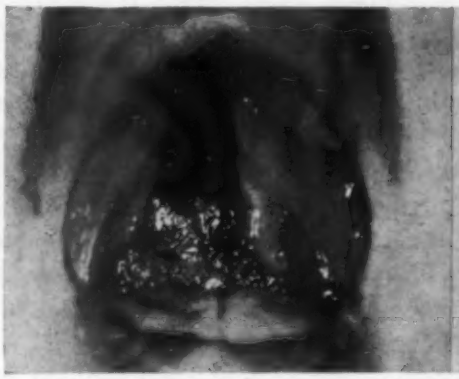


Fig. 15.

Fig. 16.

Fig. 15.—Case 3. Complete cleft of soft palate.
Fig. 16.—Case 3. Appliance in position.

Fig. 17.

Fig. 18.

Fig. 17.—Case 3. Speech appliance used for this case.
Fig. 18.—Case 3. Model showing cleft.

This man was married at the time and had a good position with a rather large corporation, but his inability to speak clearly had naturally established limitation for advancement.

He is now the father of two normal children, maintains a fine home, and has excellent business connections.

SPEECH CORRECTIVE PROGRAM

Introduction.—Before discussing the mechanics of speech correction, I should like to emphasize the necessity for close cooperative effort on the part of the prosthodontist and the speech correctionist. For either of these specialists to undertake the problem alone would be futile. Obviously, a properly fitting speech appliance is the first essential; but of equal importance is corrective speech training. The student, too, must be induced to cooperate in the wearing of the appliance and later must be stimulated to intelligent and sustained effort in corrective training. You must realize that many of these oral cripples are badly beaten from a psychologic standpoint and they need encouragement and hope.

While the technique used with individual cases will vary greatly as to detail, the broad underlying principles of correction remain the same with all speech appliance cleft palate cases. Basically the speech patterns of these persons show much similarity, the difference being in degree of defectiveness rather than in type. Of course, extreme dental malocclusion in Cases 1 and 2 gave cause for various peculiar compensations in tongue positions for speech.

Principles of Correction.—Nasal emission of breath and voice, together with very light and indistinct articulation, constitutes the main speech problem found in cleft palate speech. To correct this type of defect the student must first be physically able to partition the nose from the mouth by the aid of some mechanical device; second, he must be trained to use this new mechanism in speech itself. New muscular reactions must be learned and associated with speech. New hearing patterns, new kinesthetic patterns, and, in some cases, new visual patterns must be learned. These total configurations are learned quite easily in some cases, but in others they must be learned deliberately and consciously and then through practice made to slip into automatic speech.

SOME TECHNIQUES OBSERVED IN THE CASE REPORTS UNDER CONSIDERATION

The three students attended a six-week speech correction clinic conducted by Willard M. Wood, in Watertown, N. Y. I discussed the progress of the cases almost daily with Mr. Wood and acquainted myself with the students' problems and successes. It was necessary at various times to make adjustments in the appliances. The students were in attendance at the clinic morning and afternoon for five days each week and in addition were assigned certain types of home practice.

The opening day of the clinic was spent in getting acquainted with the staff and their fellow students. Mr. Wood outlined the general plan of the course with special emphasis on the necessity for hard work by everyone. Then the entire student group was put on "conversational silence." This device which means "no talking" was used as a means of breaking down old speech patterns. Psychologically it induced a feeling of seriousness and made for greater effort. It was invaluable where habits of articulation had to be newly learned, strengthened, and finally established as permanent equipment. Students were given pads and pencils to use, and as group plan, "conversational silence" was not considered drastic. This silence period was continued for about three weeks.

A group class was held for about forty minutes the first thing in the morning and again in the afternoon. This group instruction helped to weld the clinic together. The long and the short vowel sounds were taught in various combinations. This sort of thing built voice, relieved embarrassment, promoted relaxation, and was found very helpful. Constant suggestion leading toward mouth delivery of voice tended to build up a hearing pattern which was less nasal. The instructor's voice was of course used as a model in these exercises. Tongue gymnastics were taught using mirrors. This tended to bring the tongue under conscious control, making it more facile and a more useful organ of articulation.

The individual work following the class instruction was truly individual. One student might be working to get the sensation of air pressure in the mouth by blowing; another, by articulating *T, P, S, Z,* or *K,* another by whistling, another by deliberate contraction of the pharyngeal muscles using a mirror. There is a certain knack to this functional partitioning which is learned only by trial and error. Every "gadget" which might possibly help is given a good trial. One simple indicator of nasal emission of air was a feather taped to a card cut to fit the curve of the upper lip. Air passing through the nose was instantly detected by movement of the feather. Each student carried his own feathered card, mirror, and tongue blades.

Discussion with Mr. Wood seemed to indicate that this neuromuscular trick of partitioning the nose from the mouth usually came 100 per cent when it did come. It is one of those things which is not learned gradually, but rather is wrong today and right tomorrow. Case 3, for example, apparently made no progress for about two weeks. I changed his appliance slightly; he still made no progress for several days and then suddenly "got it." He came rushing up to Mr. Wood, able to build up air pressure in his mouth and blow up balloons. This was the afternoon that he came to the office whistling. Intensive practice is always necessary to put this new ability into speech, but the initial problem is solved when the posterior nasal port can be blocked off at will.

It came somewhat as a surprise to me how much this mouth pressure is necessary for intelligible speech. For *T, P, K, S, Z, F, V, G, SH, CH, J,* and in fact to some degree for all consonants except *M, N,* and *Ng,* we use mouth pressure, either for breath alone or for a vibrating airstream. Vowels also come almost entirely through the mouth with the average speaker. These students were suddenly able to articulate isolated consonants in combination with vowels in a normal manner, and it only remained to combine skillfully the elements in our language and build smoothly flowing speech patterns which could be established as permanent.

CONCLUSION

About six years ago it befell me to do orthodontic treatment for two cleft palate children. They both presented extensive malocclusion, and they both possessed bad cleft palate speech. After completing orthodontic treatment, it was obvious that very little had actually been done to raise their social plane or change their inferiority complexes from what they had been at the beginning.

Rather than terminate my interest in these children, I felt it my professional duty at least to attempt further rehabilitation of their handicap. I discussed the idea with Mr. Wood, our local speech specialist, and then paid a visit to the "Lancaster Rotary Club Cleft Palate Clinic" and consulted with its director, Dr. Herbert Cooper. Through the assistance of Dr. Cooper, we were eventually successful in constructing speech appliances after which these children were admitted to the speech clinic. I am happy to say that both of these young people are now in college and well on their way toward normal, successful lives.

We all know that malocclusion is usually present in most cleft palate cases. It seems to me that, as a group, orthodontists should assume considerable responsibility in regard to the cleft palate problem, for most of these patients arrive in our offices sooner or later.

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644 WOOLWORTH BLDG.

OPEN-BITE

Report of a Case

Andrew Francis Jackson, D.D.S., Philadelphia, Pa.

IN PRESENTING this case report I have purposely chosen a rather complicated case of open-bite because I have discovered from hard and painful practical experience over the years that a combination of a few "principles" of treatment of universal application, together with some carefully selected appliances, seems to be the most efficient method of dealing with this most unfortunate condition. I have also found, through the same school of painful experience, that the use of some appliances should, in cases of this kind, be avoided as one would the plague in order to avoid this condition from actually being *produced* or made worse, as a *result* of orthodontic treatment. The history of this case contains an interesting combination of both of these elements.

It is not the purpose of this short report to disturb the still waters of abysmal ignorance with any personal pebbles of speculative guesswork regarding the obscure underlying anatomic, physiologic, or psychosomatic causes which produced this condition in the particular case, but simply to accept its unfortunate features as they presented themselves, and to describe quite simply what was actually done in the way of treatment.

The patient came to me originally for consultation on June 26, 1939, at which time I made the models shown in Fig. 1. My oratorical efforts in expressing my ideas regarding the treatment apparently did not fall on sympathetic ears because the patient was taken elsewhere for treatment. I think I may have advised, among other things, the "heresy" of having four premolars removed. The patient returned again for consultation on Oct. 23, 1945, at which time the models shown in Fig. 2 were taken. During the interval the patient had had about five years of orthodontic treatment, but this had been discontinued for about a year before returning for the second consultation with me. There is no question but that all orthodontists should be artists, but it is possible that our patients are not quite ready yet for orthodontic surrealism.

Among other "changes" it will be noted that the right maxillary first and second incisors had been lost. I was told that these unfortunate members received their *coup de grâce* defending old Alma Mater on the hockey field. The space had been filled temporarily by a single tooth on a partial plate. I did not go into a lengthy case history regarding childhood diseases such as measles, adenoids, tonsils, or ingrowing toenails.

I was simply keenly aware of a very unhappy young lady and two equally distressed parents who felt that her life was ruined on account of her teeth and just wanted to have something of a practical nature done to improve the condition.

Read before the Southern Society of Orthodontists, Nov. 14, 1950.

As every experienced orthodontist knows, the functional and esthetic conditions which are present in open-bite cases are so very unfortunate for the patient and the prognosis for successful treatment is so pessimistic, that the orthodontist is quite justified in making any compromise with the natural state of affairs which may offer any prospect of improvement. In the first place, if there is crowding of the teeth it is far preferable to consider doing some judicious extracting rather than to undertake the dangerous risk of making the case worse by "conservative" treatment, and in this connection the types of appliances to be

Fig. 1.

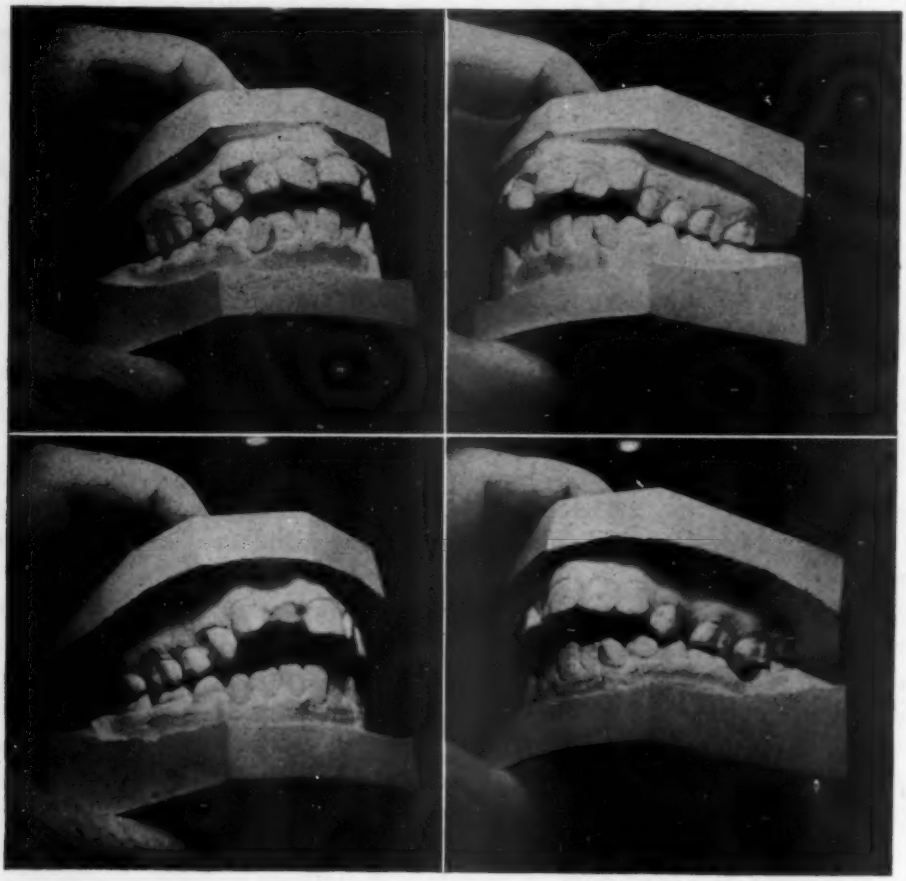

Fig. 2.

used are of paramount importance. When treated "conservatively" employing lingual arches in the "on again, off again, gone again, Finnegan" variety of their application, it has been my observation that this method is practically guaranteed to transfer open-bite conditions from the frying pan into the fire with a minimum loss of time. The use of any form of artificial denture which involves the palate likewise has some subtle connection with the gentleman who ferries the boat across the river Styx. As I think we are all fully aware that there is practically always present some form of tongue habit in connection with

these cases, it is categorically imperative to avoid the use of any types of appliances which will aggravate the misuse of this unruly organ.

On general principles, merhanical therapy is based on the intelligent use of the dynamic force generated in the appliances in coordination with the volitional muscular efforts of the patient. There is no limit to the ingenuity which may be employed by orthodontists in devising unique appliances to meet specific individual conditions. Generally speaking, however, the strategy of using reciprocal force to achieve desirable tooth movements, although quite often in opposite directions, is a sound principle of practice. If we look, therefore, at open-bite as it usually exists, it is obvious that from an anatomical standpoint it is desirable to depress (if that is possible) the molars and elongate the incisors. If this can be accomplished by one and the same appliance acting reciprocally, it contains a sound mechanic principle which is in line with logic

Fig. 3.

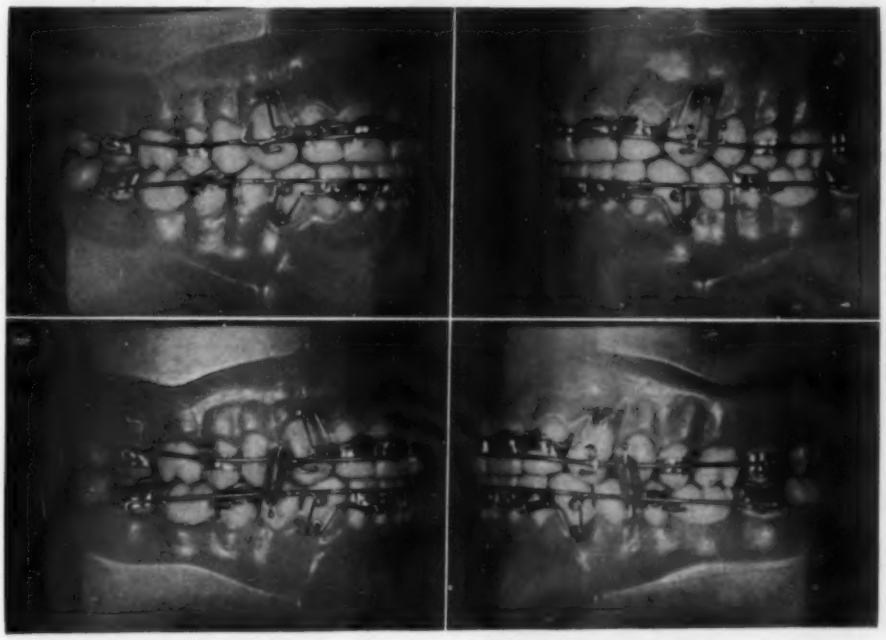

Fig. 4.

and common sense. The appliance shown in Fig. 3 is based on the simple principle of the ordinary "seesaw" on which most of us have disported ourselves while still in short trousers. The details of its construction, as applied to orthodontics, are as follows: The buccal attachments on the molars should be very short sections of tubing or mere rings and much too large for the buccal arch which lies in it—the purpose of this is to make this attachment, for all practical purposes, a "swivel" joint. In many cases of open-bite the second molars are the only teeth in occlusion; therefore these are the most desirable teeth to band. If the molar bands are placed on these teeth, the buccal arch tied to brackets on the second premolars (which are in nonocclusion), and down-

ward pressure from intermaxillary elastics applied mesially to the premolar attachment, the mechanical dynamics of the "seesaw" are set in motion. As it is also desirable to elongate the incisors, a long auxiliary spring on the "double boiler" principle may be attached to these teeth, as illustrated in Fig. 4, so that the contracting effect of the intermaxillary elastics may also have its effect on these teeth. I have found by practical experimentation that a flexible labial arch of 0.030 inch seems to be the most effective in combination with auxiliary springs of 0.020 inch. In addition to the definite mechanical effect of depressing the molars and elongating the fulcrum teeth and those mesial to them, the intermittent "pressure and release" force derived from the elastics in the opening and closing of the jaws puts into effect one of the most desirable forms of physiologic force which can be used in orthodontics.

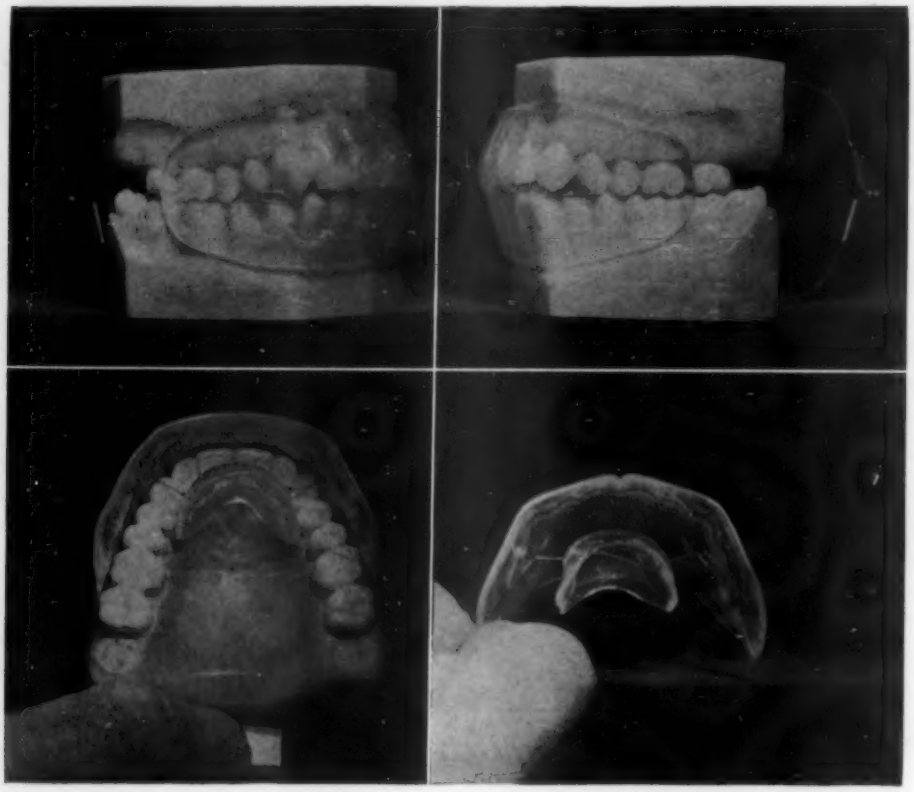

Fig. 5.

The appliance just described was used in the first stages of treatment of this patient. This was replaced later by Johnson twin wire appliances on both arches with short vertical intermaxillary elastics from hooks soldered to the caps of all the incisors which were banded, these extending from canine to canine on both arches. The missing maxillary incisor was replaced in the interval by a Steel's facing soldered to the right maxillary canine band.

The "retention" for open-bite cases is, as all experienced orthodontists well know, a matter of major importance. The "double screen" as illustrated in

Fig. 5 I have found to be one of the most effective appliances ever devised for this purpose. This appliance was first shown to me by the late Dr. Oscar Henry of London who either devised it himself or in collaboration with his associate, Dr. Smith. As open-bite cases are practically always associated with the habit of protruding the tongue between the teeth, the use of this appliance is a most effective way of correcting this habit. Although they may appear cumbersome the most amazing feature about them is that patients offer very little objection to their use. This is negligible compared to Kesling positioners. The single vestibular screen is used with extraordinary success by some European orthodontists in correcting protrusive incisors.

Fig. 6.

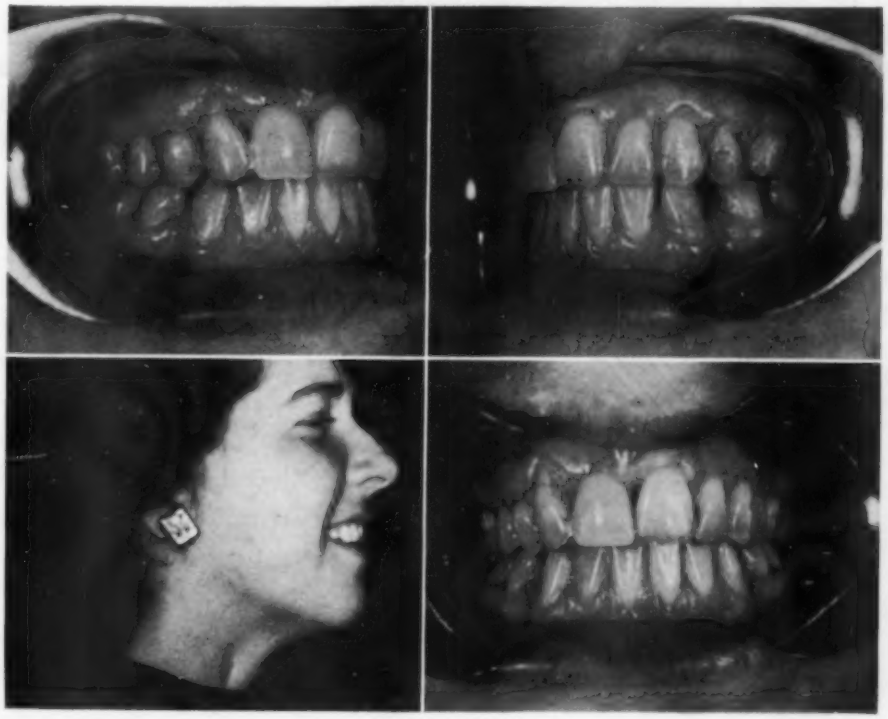

Fig. 7.

The construction of the "double screen" offers a few technical difficulties which may be greatly helped from now on by the use of some of the newer self-curing acrylics. It is necessary for its effective use that the two segments of the screen be connected by thin flexible wires which should be placed at convenient places which will not interfere with the occlusion. The laboratory which has made these screens for me so far has constructed them in two operations. The vestibular screen is first processed with the connecting wires embedded in it on the labiobuccal side, the free ends extending lingually through the occlusion. These free ends are then bent to shape and embedded in the lingual segment of the screen. It is exceedingly desirable, if not mandatory, that these screens be

made of clear acrylic as in their adjustment there may be, and usually are, spots which impinge on the soft tissues, and the blanching which is produced can be clearly seen and relieved by a little judicious grinding. The benefits of transparency in order to see "what is going on" are obvious.

The missing central incisor in this case was replaced permanently, as illustrated, by a bridge attached to the right maxillary canine. The present condition of the case is shown in Figs. 6 and 7, about two years after all fixed orthodontic appliances were removed. It is to be regretted that there was some gingival recession in the region of the upper right canine, but in view of the very extensive movement of this tooth this could hardly be avoided. This might have been obviated entirely if four premolars had been extracted in the first place. The lower first premolar had to be extracted due to an abscessed condition at the time I first undertook the treatment of the case.

The unorthodox approach and the tactics employed in the treatment of this case may be suggestive of some of the methods used by the Salvation Army, but I have never in my experience in orthodontics had more effusive expressions of gratitude for what was accomplished than I did from this patient and her family.

MEDICAL ARTS BLDG.

Reports

REPORT OF THE NECROLOGY COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1951

IT IS with regret that the Committee makes the following report of the death of our members:

Central Section of the American Association of Orthodontists:

Dr. Byron Cordes
Dr. Lawrence W. Neber
Dr. R. C. Willett

Great Lakes Society of Orthodontists:

No deaths.

Northeastern Society of Orthodontists:

Dr. George H. Caddick, Albany, N. Y.
Dr. Phillip A. Leavitt, Boston, Mass.

Pacific Coast Society of Orthodontists:

Dr. Jack M. Loughridge, Sacramento, Calif.
Dr. John R. Newcomer, Phoenix, Ariz.
Dr. Henry G. Stoffel, Portland, Ore.
Dr. James T. Walls, Portland, Ore.

Rocky Mountain Society of Orthodontists:

No deaths.

Southern Society of Orthodontists:

Dr. George M. Russell, Memphis, Tenn.

Southwestern Society of Orthodontists:

Dr. Thomas M. Robertson, Independence, Kan.

We have no obituary notices on Dr. Phillip A. Leavitt and Dr. George M. Russell, but we have on the others:

Byron Ward Cordes
1911-1950

"BYRON WARD CORDES was born Aug. 1, 1911, in Crookston, Minn. His family moved to Minneapolis in 1920 where he attended grade school and graduated from Marshall High School in 1930.

"In the fall of 1930 he enrolled at Washington University Dental School. After two years of premedical school and four years of dentistry, he graduated with honors, being presented with a key. Upon graduation he had the choice of two paths—attending Columbia University of New York, or associating with Dr. Frank Rodgers in St. Louis, Mo. After much pondering he chose the latter location.

Presented at the meeting of the American Association of Orthodontists, Louisville, Ky., April 23-26, 1951.

"In 1938 he met and married Dorothy Newman. Three children were born to this union: Dorothy Rae, Byron, Jr., and Ann.

"In 1942 the army issued its call for reserve officers, and Byron Cordes went to Jefferson Barracks and then to Fort Leonard Wood. In June, 1942, he moved to Camp White at Medford, Ore., for rigorous physical training. He received the rank of captain. In 1944 he sailed for Italy, and while serving in the Italian campaign received the Bronze Star medal and three campaign ribbons.

"In 1945 he returned home and again located in St. Louis, Mo. He belonged to many organizations. He was secretary of the St. Louis Dental Society Study Club, a member of the Society of Dental Science, the St. Louis Dental Society, the American Association of Orthodontists, the St. Louis Society of Orthodontists, of which he was president from 1949 to 1950. He was a member of the Lloyd C. Boswell American Legion Post No. 136.

"He was a man of varied interests. He was fond of music; his love of sports was inherent and he excelled in many: tennis, swimming, skating, shooting and golf.

"Orthodontics has lost a promising young and vigorous worker within its ranks in the passing of Byron Cordes."

Lawrence W. Neber
1897-1951

"LAWRENCE W. NEBER, 53, of 907½ South 6th St., Springfield, Illinois, died at 2:00 P.M., Wednesday, March 28th.

"Dr. Neber was born June 14, 1897, in Williams County. He attended Southern Illinois Normal University at Carbondale and was graduated from the University of Illinois Dental School in 1926. He had practiced Orthodontics in Springfield since 1933. He was a past president of the G. V. Black District Dental Society. At the time of his death he was councilman for the Illinois State Dental Society from the Springfield District. A lieutenant in World War I, he served as an aviator in the Air Corps.

"He was a member of the G. V. Black District Dental Society, the Illinois State Dental Society, the American Dental Association, the American Association of Orthodontists, the Masonic Lodge, American Legion Post 32.

"Surviving are his wife, Lucille, one daughter, Dr. Elizabeth N. King, of Springfield, two grandchildren, and one brother, Marion, of Hollywood, Florida."

R. C. Willett
1877-1950

"It is difficult to write in memory of a colleague, a friend, and a fellow alumnus of Washington University, School of Dentistry. Life entails death; therefore, one must submit to the inevitable. In the death of Raymond Clair Willett of Peoria, Ill., dentistry for children has lost another pioneer and a faithful servant. His name will long be remembered in the annals of dentistry.

"Dr. Willett died Dec. 23, 1950, after a brief illness. He was active in his office until the week before the curtain fell. He was born on April 27, 1877,

at Powesheik County, Iowa, of parents whose ancestry is well rooted in American history and tradition that date back to the days before the American Revolution. It may be truly said that he was a pioneer and a descendant of pioneers.

"He is survived by his gracious widow, the former Miss Ruth Wheeler, and their daughter Martha (Mrs. James Gaebe), and he is survived by his name, his works, a noble memory, and by a countless number of friends and admirers.

"His scientific contributions to dentistry for children and to orthodontics are too well known to be cited again. For these outstanding contributions to dentistry, Washington University, his Alma Mater, conferred upon him, in 1941, the honorary degree of Doctor of Science. Similarly in 1946, the American Association of Orthodontists awarded him the highly esteemed Albert H. Ketcham Award. With humility he accepted these honors and continued until the very end to give his best.

"His work for the children of Peoria is worthy of mention. He treated rich and poor alike. The dental clinics of the public schools of Peoria owe their existence to him and men like him.

"Dr. Willett was president of Peoria District Dental Society in 1913; life member of the Illinois State Dental Society and its vice-president in 1934; vice-president of the American Association of Orthodontists for three consecutive years, 1942, 1943, and 1944; charter member of the Chicago Association of Orthodontists and its president in 1935-1936; member of Omicron Kappa Upsilon; a Fellow of the American College of Dentists; and Honorary member of the American Academy of Pedodontics. Dr. R. C. Willett left dentistry and the world in a far better shape than he found them. We owe him a debt of gratitude.

R. E. M."

George H. Caddick
1880-1950

"GEORGE H. CADDICK, of Albany, New York, one of the charter members of The Northeastern Society of Orthodontists, died on August 4, 1950, at his summer home, Bolton Landing, Lake George, New York. He was born in Troy, New York, in 1880 and received his dental education at the Pennsylvania College of Dental Surgery from which institution he was graduated in 1907. From 1912 to 1915 he was associated with the late Dr. C. W. B. Wheeler in the exclusive practice of orthodontics in New York City after which time he moved to Albany where he practiced orthodontics for more than 35 years. He was district Governor of Kiwanis and a Past President of the Albany Kiwanis Club and a 32nd Degree Mason. He was a member of The American Association of Orthodontists, The Northeastern Society of Orthodontists, The American Dental Association, and The New York State Dental Society. He is survived by his widow, Margaret Gillespie Caddick; a daughter, Dr. Lois Caddick

Menzies, Rome, New York, and Mrs. John Martin of San Diego, California; and two brothers, James G. Caddick, Hempstead, Long Island and Charles C. Caddick, Troy, New York."

Jack Monroe Loughridge

"The tragic death of Jack Loughridge was a great shock to his many friends in the dental profession.

"Jack was born in Sacramento 44 years ago, attended school there, then entered the University of California, College of Dentistry in 1924. He was married during his freshman year, and son Jim, known to many of us, arrived soon after. Jack graduated with the Class of 1928 and practiced two years before attending the University of California College of Dentistry for graduate work in orthodontics. He practiced in Sacramento and Reno.

"He was a man with tremendous energy, worked hard and played in the same way. He attended meetings with a great deal of enthusiasm and had the ability to enthuse those about him. He was a liberal friend to a fault and was always ready to share another's trouble.

"Jack was a good orthodontist, always striving for perfection. His patients loved him and the dental profession respected him.

"Death has taken a fine man from us and we will miss him greatly, yet we cannot help but feel that in that mystery of the Great Beyond we will again hear that strong voice call out, 'Hi-ya Buck!'

"May we extend our deepest sympathy to Mrs. Loughridge and James."

John R. Newcomer

"On July 7, 1950, John Newcomer met his death en route from Phoenix to his summer cottage at Prescott, Arizona.

"John was born in Riverside, California. He came to Phoenix at the age of 14, graduated from Phoenix Union High School, and in 1919 from University of Southern California Dental School.

"John was a World War I Veteran. He practiced general dentistry at Douglass, Arizona, from 1919 until 1931, when he formed an association with Charlie Tweed in Phoenix. Some 18 months later, John opened independently.

"He was chairman of the executive committee of St. Luke's Hospital, a member of the Trinity Episcopal Cathedral, the Masonic Order, El Zaribah Shrine, Knights Templar and the Kiwanis Club.

"John is survived by his wife, two children and three grandchildren.

"Dr. Newcomer was an excellent orthodontist, a man of many friendships, a valued citizen of his community.

"His last words to me were, 'Goodbye, I'm going up where it's cool.'"

Henry G. Stoffel

"Henry G. Stoffel, Associate Professor of Orthodontics at the University of Oregon Dental School, died March 30, following a heart ailment.

"Born in Mechanicsville, Iowa, Henry received his professional education at the University of Iowa, graduating in 1928. He was a staff member

at the Eastman Dental Clinic in Rochester, New York, until coming West to join the orthodontic department at the University of Oregon Dental School in 1932. He received his Master's degree in orthodontics for a thesis on a study of malocclusion in identical twins. As a clinician before local and state meetings, he was greatly interested in embryological evolution of the dental structure, also habit and mechanical interferences, leading to orthodontic problems.

"He was a member of Omicron Kappa Upsilon, Delta Sigma Delta, East Portland Rotary Club, the A.D.A. and Component branches.

"In addition to his classes and clinical assignment at the Dental School, Henry was in private practice with offices in the Hollywood district.

"Surviving family are his parents and a sister, of Mechanicsville, Iowa. Services were held at the Colonial Mortuary with interment at Riverview Cemetery."

James Thompson Walls

"JAMES THOMPSON WALLS died on August 7, 1950. He was born in Portland on January 21, 1897, graduating from North Pacific College of Oregon in 1918. He first jointed the Oregon State Dental Association in 1921.

"He practiced general dentistry a short time in Powers, Oregon. He studied Orthodontics at the Dewey School of Orthodontia in New York City and has since practiced Orthodontics in Portland in the Medical Dental Building and in Salem. He was a member of the Pacific Coast Society of Orthodontists, American Association of Orthodontists and the American Board of Orthodontia. He was also a member of Xi Psi Phi Fraternity.

"Survivors are the widow, two sisters, a son and a daughter and five grandchildren."

Thomas M. Robertson
1875-1951

"Dr. Robertson, an Orthodontist, had practiced in Coffeyville since moving there in 1900. He also had an office in the Citizens National Bank Building and had practiced here two days a week for the past 23 years.

"He was born in Jewell County, Kansas, September 20, 1875, and his wife Tammah Robertson preceded him in death October 18, 1948. He had been active in Masonic affairs for over 50 years and was a member of the State and National Dental Societies. He was also a member of the National and International Associations; secretary of the Coffeyville Zoning Board, and a member of International Dentistry.

"Only last spring at the University of Kansas Dental Meeting Dr. Robertson was presented a certificate of award for having practiced dentistry in the State of Kansas for fifty years.

"Survivors include a daughter, Mrs. F. B. Kikendall, Coffeyville; a brother, I. A. Robertson, Kansas City; one sister, Mrs. J. L. Smith, Coquille, Oregon; a daughter-in-law, Mrs. Margaret Robertson, Oklahoma City, Oklahoma; and three grandchildren."

JAMES W. FORD, Chairman.

REPORT OF THE PUBLIC RELATIONS COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1951

DURING the past year your Committee has had innumerable requests from various sections of the country for literature sponsored by the American Association of Orthodontists for use in state dental associations and local dental associations. There have also been requests from various sections of the country for literature to be used at Parent-Teacher Association meetings. Several high school students who are looking into the future have written in requesting information and literature to assist them in writing a thesis, as well as to give them some idea of what the orthodontic profession really has to offer. It has been a perplexing situation owing to the fact that as yet the Public Relations Committee of our Association has no definite or unified program.

In 1950 the sectional chairmen were invited to discuss their sectional problems. It was the desire of your committee and also a number of the leading orthodontists throughout the country to formulate a unified program that could be used at the community level. Some splendid suggestions were submitted. It was felt that further thought should be given this vital question before definite recommendations were made to the Board of Directors of the American Association of Orthodontists.

On Tuesday evening, April 17, 1951, Donald P. MacDonald, Attorney-at-Law, Federal Trade Commission, Washington, D. C., and his associate, Mr. Harold A. Cuff, interviewed me, or questioned me, informally for approximately two hours relative to any action that had been taken by the American Association of Orthodontists concerning orthodontic laboratory advertisements that had appeared in any of the trade journals, dental journals, or orthodontic journals since I had been a member of the Public Relations Committee of the American Association of Orthodontists. Mr. MacDonald asked me for any records or minutes that the Public Relations Committee had pertaining to laboratory discussion. They insisted on knowing definitely whether any formal or informal action had been taken by the American Association of Orthodontists relative to laboratories advertising orthodontic services in the various dental and orthodontic journals. They specifically wanted to know what action had been taken relative to the Boos' ad that appeared in the May, 1950, issue of *The Journal of the American Dental Association*. They stated that this ad appeared on page A-29 of *The Journal of the American Dental Association*. Mr. MacDonald stated that one component society had officially referred the problem of orthodontic laboratory advertising to me as chairman of the Public Relations Committee of the American Association of Orthodontists. I told him that I did not keep the letter as I did not feel that I was in a position to take any definite action, but planned to bring this to the attention of the Board of Directors of the American Association of Orthodontists

Presented at the meeting of the American Association of Orthodontists, Louisville, Ky., April 23-26, 1951.

at their next annual meeting. Mr. MacDonald wanted to know when I was appointed a member of the Public Relations Committee. I informed him that I was appointed to this committee at the annual meeting held in Columbus, Ohio, in April, 1948. He asked me if I did not feel it would have been better for the American Association of Orthodontists to have placed their complaint before the Federal Trade Commission rather than boycott Boos' ad that appeared in *The Journal of the American Dental Association*. I stated that the American Association of Orthodontists had never, to my knowledge, taken any official action pertaining to laboratory advertising since I had been a member of the Public Relations Committee of the American Association of Orthodontists. Mr. MacDonald assured me that any complaint received by the Federal Trade Commission would receive prompt attention and investigation, also assuring me that it was the business of the Federal Trade Commission to correct misrepresentation and false advertising. He suggested that Mr. Joseph Sheehe would be the man to send complaints to or consult in person. He is the Director of the Anti-Monopoly Bureau of the Federal Trade Commission, Washington, D. C.; or he suggested sending them to Mr. Richard Whittey, Chief of the Bureau of Anti-Deceptive Practices, Federal Trade Commission, Washington, D. C.

It is recommended that any complaint relative to advertising which pertains to orthodontics be sent to the Public Relations Chairman of the American Association of Orthodontists, who in turn will refer the complaint to the Federal Trade Commission, if it be deemed valid.

The Public Relations Committee feels that material approved by the Association, interestingly written, properly edited, and carrying the true picture of dental health would be of great assistance to men at the community level who could, through the use of this material, accomplish a very beneficial Public Relations program, through the use of the local press and radio with no cost to the Association.

We recommend that the Public Relations Committee be authorized to draft material based on a positive approach of educating the public to the value of preventive dentistry to be released by the Public Relations Chairman of the component associations for use in their respective state and local dental associations.

Respectfully submitted,
G. HEWETT WILLIAMS,
FRANK P. BOWYER,
FREDERICK R. ALDRICH, Chairman.

(On motion of Vice-President Robison, seconded by Dr. Adams, there being no discussion, it was voted unanimously to accept the report with its recommendations.)

REPORT OF THE PUBLIC HEALTH COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1951

THE Public Health Committee has completed its first year as a standing committee of the American Association of Orthodontists. During the past year, the Committee has engaged in the following activities:

1. The Committee has cooperated with the American Dental Association in the preparation of a brochure, "Questions and Answers on Orthodontics," which has since been published by the American Dental Association.

2. The Committee has continued to cooperate with the Department of Health of the State of New York in preparing a handbook on "Preventive Orthodontics" for distribution to general practitioners.

3. The Committee prepared a tentative statement on "Fact Finding Report on Health Services—Orthodontics," which was submitted to the White House Conference and published in the AMERICAN JOURNAL OF ORTHODONTICS in January, 1951.

4. Various members of the Committee attended conferences of the White House Conference Committee on Participation of National Organizations.

5. Members of the Committee attended the White House Conference as accredited delegates of the American Association of Orthodontists. The report on the Conference is scheduled for presentation before the General Sessions of the American Association of Orthodontists and will be published in the JOURNAL.

RECOMMENDATIONS

The Committee recommends:

1. The development of dental health exhibits suitable for exhibition purposes before dental, medical, public health, and other organizations interested in child health.

2. A survey should be made of presently available orthodontic clinic services.

3. Information should be obtained on the number and distribution of full-time and part-time practitioners in orthodontics.

4. The tentative outline submitted to the White House Conference be further developed as a means for ascertaining the present status and future needs of orthodontics in the health and welfare of the child population of the United States.

Respectfully submitted,

J. A. SALZMANN, Chairman,
L. BODINE HIGLEY,
LEIGH C. FAIRBANK,
B. HOLLY BROADBENT,
HERBERT K. COOPER.

Presented at the meeting of the American Association of Orthodontists, Louisville, Ky., April 23-26, 1951.

Department of Orthodontic Abstracts and Reviews

Edited by
Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Some Observations on the Growth of the Alveolus in Man: By W. Russell Logan, *D. Record* **69**: 129-133, 1949.

"The so-called retained or submerged temporary molar has held a place in recorded observation since the middle of the nineteenth century. In this not very uncommon condition with which I am sure you are all very familiar, one or more of the deciduous molars is found to be lying below the occlusal plane. In the most extreme form of the condition the molar is completely enveloped in the alveolar bone, giving rise to the supposition that the tooth may never have erupted. Various terms have been used to describe the condition, varying according to the diverse views as to the etiology of the misplacement of the tooth. Such terms as inclusion, retention, ingression, enclavement, impaction, persistence, shortening, have been used in the description of what is essentially an identical clinical entity. . . .

"Oppenheim working on primate histological material demonstrated that both alveolar bone and deciduous tooth are absorbed to a larger extent than the actual movement of the permanent successor requires and that a new formation of both bone and cementum could take place during quiescent periods. During such a period, it is possible for a solid junction between the bone and the dental tissues of the deciduous tooth to occur. Kronfeld in his textbook gives a fine illustration of an extensive bony union between a lower deciduous second molar and the alveolar bone. . . .

"There came into my hands through the courtesy of a colleague the radiographs of a brother and sister of thirteen and sixteen years of age respectively. The children were to all appearance perfectly healthy and well developed. It was noted however that several of the deciduous molars were still persisting when they should have been shed, and on that acount the cases were submitted to radiological examination. The films of the girl's cheek teeth region show in the first place that the permanent first molars have been extracted some time previously and that gaps occur in the dentition, on the right side from the canine to the second molar with a retained first milk molar in contact with the canine, and on the left side from an erupted first premolar to the second permanent molar.

"If the intervening bone shadow is carefully inspected a variation in the trabecular pattern is evident, the phantom as it were of the sockets of the second deciduous molars. The roots have apparently been absorbed and bony tissue laid down in their place but the subsequent remodelling of the bone structure and its integration with the trabecular system of the surounding bone has not taken place. It is also to be noted that a similar process has occurred at the roots of the right first milk molar where finally a fusion of dental tissue and alveolar bone has given rise to a typical retained milk molar, the occlusal surface of which is level with the cingulum of the, by now, fully erupted permanent canine. . . .

"On careful examination one can perceive the entire outline of the sockets of both roots. The appearance is limited above by what would appear to be the lip of the previous alveolar socket and it is to be noted that this now lies some five millimeters below the present alveolar edge. . . .

"From this point as datum can be demonstrated the growth of the alveolus in height as being in the region of five millimetres. It is also demonstrated that the roots of the permanent teeth do not grow downwards into the basal bone. The crown and the roots as they are formed move upwards in the growing alveolus.

"When the films are examined for evidence of horizontal movement, there is little definite information to be had from this particular case apart from the unlikeness of any forward movement amounting to anything like the breadth of a molar. The right first premolar is in front in contact with the canine and shows little if any movement forward from the phantom roots of the deciduous molar. The second molar shows characteristic tipping following the loss of the first molar but again, taking into consideration the position of the apex, no evidence of forward movement is to be seen. . . .

"As to forward movement, however, I would submit that there is no evidence whatever. If the dentition had moved forward since the formation of the phantom about the age of three and a half years, then the deciduous molar would lie not directly above the phantom but obliquely above and before it. In addition, any forward movement of the permanent first molar would of necessity bring its roots into the area of the phantom socket and, as it were, eclipse it to some extent. Of this there is no sign whatever. . . .

"The conclusions which I draw from the study of these two cases are the following. In two children whose dento-alveolar development, apart from the absence of certain teeth of the second dentition, could be considered well within normal limits, there is demonstrated a vertical growth of the alveolar process in both upper and lower lateral segments of the region of five millimetres between the age of about three years and puberty. During that time there was no evidence of any forward movement of the lower molars, apart possibly for a certain tipping to take up the extra space afforded by the succession of the narrower second premolar to the broad second deciduous molar. No evidence is available by this method regarding antero-posterior growth in the upper jaw."

Psychosomatics and Suggestion Therapy in Dentistry: by Jacob Stolzenberg, D.D.S., New York, The Philosophical Library, Inc., 1950, Price, $3.75. 152 pages.

The author discusses the association between specific organic dysfunction and neuroses, based on medical and dental reports. This stimulates thought and provokes further reading and study of these phenomena in relationship to dental problems. This book is a laudable attempt to awaken the dental profession to a useful aid which can be used in its armamentarium. Dentistry is associated with pain in the mind of the patient. It is the author's intention to advocate hypnosis, not as a substitute for anesthesia, but as an adjunct in preparing the patient for the insertion of the needle. He goes on to say, "By the use of hypnosis, it is possible to dispel the fear of anesthesia and avoid organic alterations in blood pressure, heart rate, capillary permeability, urinary output, coronary flow, rate and depth of respiration and carbon dioxide content of the blood, which are the responses of the body to emotional upsets."

Besides the background of hypnosis which contains a synopsis of the medical history of hypnosis to the present day, interesting sidelights and anecdotes on the subject are generously interspersed to make the book enjoyable reading,

as well as to make one conscious of its practical application in all walks of life whether on a conscious or subconscious level. From Mesmer's primarily selfish secret animal magnetism attempts to the scientific studies initiated by James Braid of England, and carried forward by Bernheim, Liebault, Charcot, Breuer, and Freud to modern psychiatry, Dr. Stolzenberg carried the reader along on an interesting and illuminating journey.

From the practical viewpoint, the specific and all-inclusive references to everyday dental problems and their handling by suggestion at conscious and subconscious levels are a boom to the dental practitioner as well as to his patients, and a must to the dentist who wants to keep abreast with what is being done to help alleviate some of mankind's discomfort and suffering.

The breaking of undesirable habits associated with dental malfunction is gone into in detail with full and complete methods of treatment.

The author in his text makes us understand that any dental problem requires for its successful solution not only the specific dental structures involved but the general physical and mental well-being of the patient, as well as the physical and mental well-being of the operator.

With the full sympathetic understanding and solution of these problems, we are ourselves rewarded with greater success, longevity, and peace of mind.

B. A. LANDIS.

Food and Preventive Dentistry. Quoted from *Brit. D. J.* (Letters to the Editor) **88**: 280, May, 1950.

"SIR—I noticed in the public press that an alteration in the extraction rate of flour was suggested in Parliament, in order that bread may be made whiter, and to produce more feeding stuffs for stock. It is well known that in this process a proportion of valuable calcium and phosphorus salts and vitamins are eliminated. Nearly thirty years ago I was on a committee appointed by the B.D.A., to inquire into food adulteration, over-refining, and deficiencies in modern diet, and read a paper, about the same time, at a meeting of the Southern Counties Branch of B.D.A. at Tunbridge Wells. Many authorities have stressed the importance of cleanliness and quality of food and the necessity to prevent the elimination of the above, through over-refining and deterioration in tins and packets when stored for long periods. The physical effect of this over-refining is of course seen in nearly all jaws, and one seldom sees room for 32 teeth.

"The indirect effect is again under development, through early loss of deciduous teeth from caries. We are all familiar with cases of pre-school children having very carious molars extracted between 3-5 years of age and 6-year-old children with cavities in the 1st permanent molars. We also know, in the former case, that the 1st permanent molars are going to erupt too far forward and cause irregularities unless they, or other teeth, are extracted later.

"Generally it is useless to expand arches which are already too small for the number of teeth. The best teeth and developed jaws I ever saw were in a Lithuanian, whose bread was made from very dark wholemeal flour. I practised in Kenya Colony, East Africa, for twenty-three years and noticed that natives in the reserves with natural rough food had very little caries. The teeth were mostly regular in well-developed jaws, and consequently parodontal disease was infrequent. The Indians did not have caries to any great extent, but, owing to the softer consistency of their food, were more prone to parodontal disease. When the natives came into contact with civilisation—especially the native cook type who used to live, to a great extent, on European

food, carious teeth were often seen. Unless we reform our food habits and prevent further deterioration of essential foods—preventive dentistry cannot be built on a sure foundation. I suggest that a start is made with bread, and that it should be made compulsory for the date of manufacture to be stamped on the container of all tin and packet foods—together with the name and amount of any added preservative or chemical. The latter should apply to all foods.

"I returned to England after twenty-four years abroad, and found that there is still a large percentage of children with caries and underdeveloped jaws, and the priority service to cope with this serious situation is inadequate.

"An adequate, satisfied and well-paid school dental service is not only necessary to improve the nation's teeth, but general health also. It would save money, taking the long view.

"Yours faithfully,

"C. E. T."

Osteogenesis Imperfecta (Odontogenesis Imperfecta). Report of a Case: by Jerome Mittleman, *Oral Surg., Oral Med. & Oral Path.* **3**: 1562-1564, December, 1950.

M. S., who is 61 years old, has had 9 fractures. None were caused by any great amount of trauma; they all healed rapidly. Her diet has been normal. She is believed to have osteogenesis imperfecta congenitalis. This form develops in utero, and its victims may die before or shortly after birth. Osteogenesis imperfecta tarda commences at any time during childhood or adolescence.

Although the exact etiology is unknown, it appears to follow the Mendelian Law of Heredity being dominant and possibly sex-linked with the female. The disease appears to be caused by genetic damage to the osteoblasts, which are retarded in function and differentiation. They produce coarse fibrillar bone when we should see lamellated bone.

Radiographic studies showed the long bones to be underdeveloped. The principal pathologic change appeared to be lack of the normal compact layer in the diaphyses of the long bones, mandible, and, to a lesser degree, in other bones. Growth in thickness was impaired as it depended on osteoblastic activity in the periosteum. All bones showed degenerative demineralization. Trabeculae appeared lacelike and delicate. There was collapse of all of the vertebral bodies. Kyphoscoliosis was quite apparent, adding to the dwarflike appearance. Bones of the calvarium showed great evidence of demineralization.

The connective tissue throughout the body is usually more friable. The sclera appears blue.

Fractures heal rapidly, but unite with a cartilaginous callus. Bony replacement is retarded. Fractures occur less frequently with age; at times fragility will disappear at puberty. There is no specific treatment.

Orally, the condition is manifest as odontogenesis imperfecta or hereditary opalescent dentine. M. S.'s teeth had a homogeneous amberlike translucency, although her first permanent molars were grayish. On eruption, the crowns had a steel-gray appearance, but acquired the opalescence with time. Both permanent and deciduous teeth were affected. The number was normal and the arrangement good. The occlusal surfaces of the molars were worn flat. Because of wear, we see dark dentine surrounded by the normal enamel. The dentine is soft, though not abnormally susceptible to decay. Radiographic study shows the roots to be disproportionately short in size. Adventitious dentine fills the pulp chambers so that crowns appear solid.

News and Notes

The 1952 Meeting of the American Association of Orthodontists

The 1952 meeting of the American Association of Orthodontists will be held at the Jefferson Hotel, St. Louis, Mo., April 21 to April 24.

The chairman of the Local Arrangements Committee is Leo M. Shanley, 7800 Maryland Ave. The following local committees have been named to make the arrangements for the meeting:

Local Arrangements

Leo M. Shanley, Chairman	7800 Maryland Ave.	St. Louis, Mo.
E. V. Holestine, Treasurer	8015 Maryland Ave.	St. Louis, Mo.
Otto W. Brandhorst	4952 Maryland Ave.	St. Louis, Mo.
George H. Herbert	7002 Pershing Ave.	St. Louis, Mo.
Benno E. Lischer	313 N. Rock Hill Road	Webster Groves, Mo.
Albert C. Mogler	462 N. Taylor Ave.	St. Louis, Mo.
H. C. Pollock	8015 Maryland Ave.	St. Louis, Mo.
Frank C. Rodgers	Missouri Theatre Bldg.	St. Louis, Mo.
Henry F. Westhoff	Missouri Theatre Bldg.	St. Louis, Mo.
Joseph H. Williams	3722 Washington Blvd.	St. Louis, Mo.

Stag Dinner

Joseph H. Williams, Chairman	3722 Washington Blvd.	St. Louis, Mo.
Robert E. Bedell	1504 S. Grand Ave.	St. Louis, Mo.
Carl L. Rister	University Club Bldg.	St. Louis, Mo.
George Herbert	7002 Pershing Ave.	St. Louis, Mo.

Ladies' Entertainment

Earl C. Bean, Chairman	120 N. Forsythe Blvd.	St. Louis, Mo.

Co-Chairmen

Mrs. B. G. deVries		
Mrs. H. C. Pollock	40 Fair Oaks	St. Louis, Mo.
Mrs. Otto W. Brandhorst	160 S. Gore Ave.	Webster Groves, Mo.
Mrs. Joseph H. Williams	24 S. Gore Ave.	Webster Groves, Mo.
Mrs. Leo M. Shanley	5 Glen Forest	St. Louis, Mo.

Press

H. F. Westhoff, Chairman	Missouri Theatre Bldg.	St. Louis, Mo.
H. C. Pollock	8015 Maryland Ave.	St. Louis, Mo.

Banquet and Luncheons

Virgil A. Kimmey, Chairman	3722 Washington Blvd.	St. Louis, Mo.
Robert E. Hennessy	8013 Maryland Ave.	St. Louis, Mo.
Robert C. Byrne	2602 S. Grand Ave.	St. Louis, Mo.

Clinics

Otto W. Brandhorst, Chairman	4952 Maryland Ave.	St. Louis, Mo.
Virgil A. Kimmey	3722 Washington Blvd.	St. Louis, Mo.
J. E. Rook	6651 Enright Ave.	St. Louis, Mo.

Registration

George Moore, Chairman	Box 8	Ann Arbor, Mich.
John Byrne, Co-Chairman	2602 S. Grand Ave.	St. Louis, Mo.

Commercial Exhibits

Earl E. Shepard, Chairman	4500 Olive St.	St. Louis, Mo.
William S. Brandhorst	4952 Maryland Ave.	St. Louis, Mo.
Fred Fabric	4559 Scott Ave.	St. Louis, Mo.

	Hosts	
Leo B. Lundergan, Chairman	4500 Olive St.	St. Louis, Mo.
Robert M. Courtney	University Club Bldg.	St. Louis, Mo.
Kenneth C. Marshall	35 N. Central	St. Louis, Mo.
Quentin M. Ringenberg	3722 Washington Blvd.	St. Louis, Mo.
	Property	
A. C. Mogler, Chairman	462 N. Taylor	St. Louis, Mo.
Paul E. Spoeneman	16 Hampton Village Plaza	St. Louis, Mo.
E. W. Hodgson	Missouri Theatre Bldg.	St. Louis, Mo.
	Reception	
H. C. Pollock, Chairman	8015 Maryland Ave.	St. Louis, Mo.
Benno Lischer	313 N. Rock Hill Road	Webster Groves, Mo.
Frank C. Rodgers	Missouri Theatre Bldg.	St. Louis, Mo.
Joseph Williams	3722 Washington Blvd.	St. Louis, Mo.
Otto W. Brandhorst	4952 Maryland Ave.	St. Louis, Mo.
	Hotel Reservations	
J. E. Rook, Chairman	6651 Enright	St. Louis, Mo.
H. C. Pollock, Jr.	8015 Maryland Ave.	St. Louis, Mo.
	Information	
George Herbert, Chairman	7002 Pershing Ave.	St. Louis, Mo.
Clarence R. Geier	3417 Meramec Ave.	St. Louis, Mo.
Everett W. Bedell	1504 S. Grand	St. Louis, Mo.

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	J. A. Salzmann	E. C. Lunsford	

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B. Holly Broadbent, 1954
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Nathan G. Gaston, 1954

Nomenclature

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Miami, Fla.
W. Robert MacConkey, 1952
Ernest T. Klein, 1953
Marion A. Flesher, 1954
Paul V. Reid, 1956

Program

Max E. Ernst, Chairman
1250 Lowry Medical Arts Bldg.
St. Paul 2, Minn.
L. Bodine Higley
Ernest L. Johnson
Silas J. Kloehn
Lowrie J. Porter
J. A. Salzmann (ex officio)

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Leo M. Shanley, Chairman
7800 Maryland Ave.
St. Louis, Mo.
E. V. Holestine, Treasurer
8015 Maryland Ave.
St. Louis, Mo.
Otto W. Brandhorst
George H. Herbert
Benno E. Lischer
Albert C. Mogler
H. C. Pollock
Frank C. Rodgers
Henry F. Westhoff
Joseph H. Williams

Great Lakes Society of Orthodontists

The Twenty-second Annual Meeting of the Great Lakes Society of Orthodontists will be held Nov. 5, 6, and 7, 1951, at the Statler Hotel, Cleveland, Ohio.

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists will be held at the Hotel Warwick, Philadelphia, Pa., on Nov. 12 and 13, 1951.

The New Orleans Dental Conference

The Fourth Annual New Orleans Dental Conference will be held at the Roosevelt Hotel, New Orleans, Nov. 11, 12, 13, and 14, 1951.

Dr. M. R. Matta, Secretary,
629 Maison Blanche Bldg.,
New Orleans, La.

European Orthodontic Society

In 1952 the Congress of the European Orthodontic Society will take place in Amsterdam, Holland, from July 14 to July 17.

These data are chosen in view of the congress of the F.D.I. which starts on July 19, 1952, in London. We hope that many Americans who will attend the meeting of the F.D.I. will take the opportunity to come over to Amsterdam.

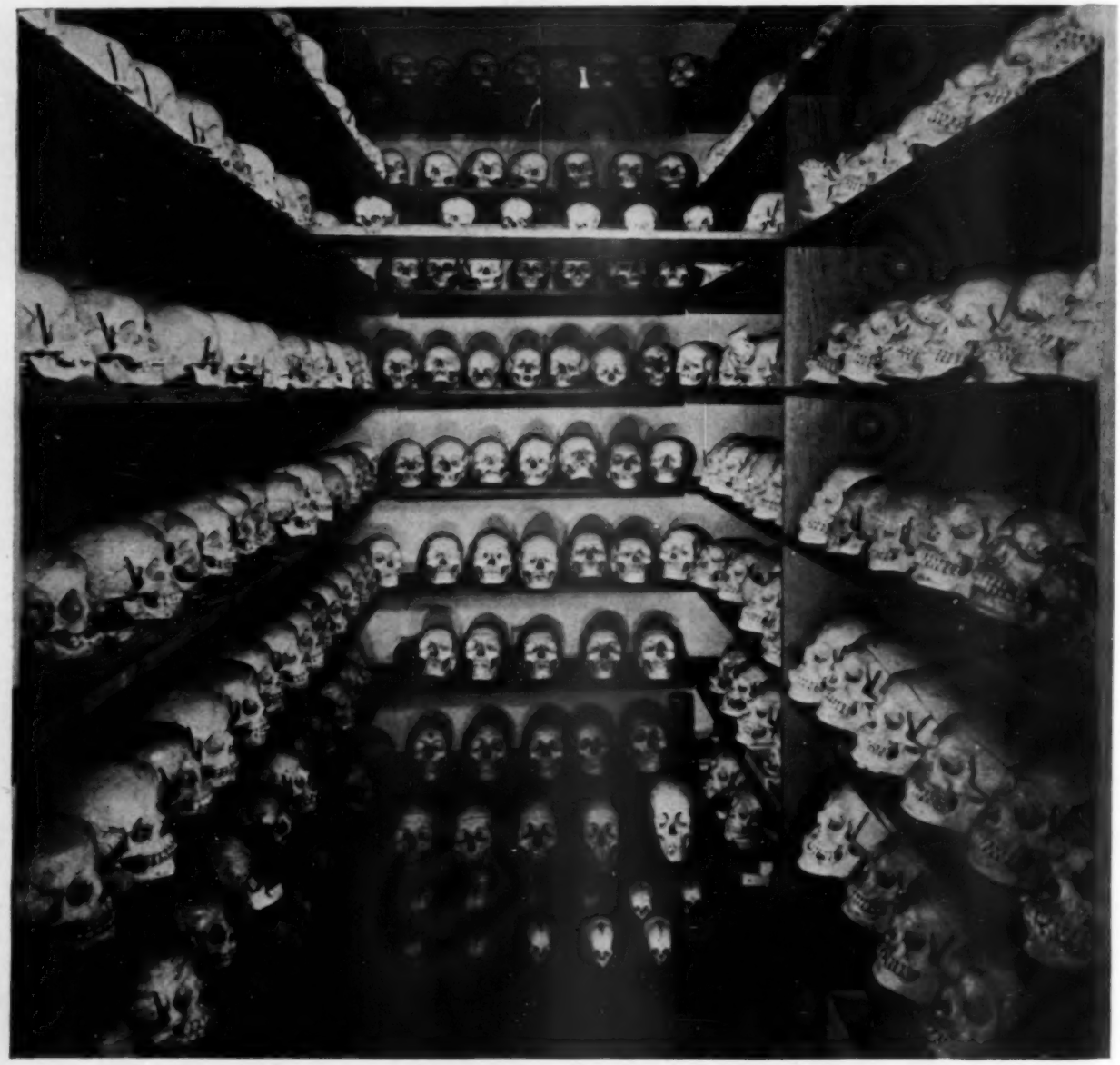
Further details can be obtained from:

Mr. J. A. C. Duyzings, President,
Hamburgerstraat 19,
Utrecht, Netherlands.

The Atkinson Skull Collection

Dr. Spencer Atkinson, of Pasadena, Calif., has been collecting and studying skulls in the past thirty-five years.

Dr. Atkinson exhibited some 200 human skulls from his collection of 1,000 at the meeting of the American Association of Orthodontists in Louisville in April. There were skulls that revealed the effects of thumb-sucking, sleeping postures, and other habits of childhood that affect the position of the teeth.



ATKINSON SKULL COLLECTION

Dr. Atkinson keeps his collection in an eight-room laboratory in his home at Pasadena, Calif., near the University of Southern California Dental School, where he is professor of orthodontics. The skulls came from 17 countries, and about one-third are children's. "You can't get children's skulls in this country, because institutions look after children who don't have parents."

Dental school teachers and students from all over the world have studied the collection, and parts of it are constantly being sent out for clinical studies.

Dr. Atkinson, a genial, quiet-spoken man with a supply of funny stories about as large as his professional collection, is currently preparing two books on his findings. Some of them disprove things long taught in dental textbooks and promise to improve the science of orthodontics.

Central Section of the American Association of Orthodontists

The 1951 meeting of the Central Section of the American Association of Orthodontists will be held Oct. 1 and 2, 1951, at the Lowry Hotel, St. Paul, Minn. The program follows:

MONDAY, OCT. 1, 1951

Morning Session

9:00 Welcome
9:30 Diagnosis and Prognosis of Various Types of Class II, Division 1 Malocclusions. Bercu Fischer, D.D.S., New York, N. Y.
10:30 Organizational Responsibilities of Orthodontists. B. G. deVries, D.D.S., Minneapolis, Minn.
11:30 Business Meeting

Afternoon Session

2:00 Relation of Cleft Palate Surgery to Malocclusion. Wayne B. Slaughter, M.D., Chicago, Ill.
3:00 Variations of the Temporomandibular Joint Associated With Malocclusions. Robert Ricketts, D.D.S., M.S., Chicago, Ill.
4:00 What Does Extraoral Anchorage Accomplish? Beulah Nelson, D.D.S., Oak Park, Ill.
6:15 Social Hour
7:00 Dinner

TUESDAY, OCTOBER 2, 1951

Morning Session

9:00 Guides Used in Deciding to Extract Teeth in Treating Class I Malocclusions. George A. Dinham, D.D.S., Duluth, Minnesota.
10:00 Closing Spaces After Extraction in Orthodontic Treatment. Howard Yost, D.D.S., Grand Island, Nebraska.
11:00 Problems in Altering Children's Habitual Activities. Paul C. Benton, M.D., Minneapolis, Minnesota.
12:15 Luncheon and Election of Officers.

Afternoon Session

1:30-4:00 Table Clinics

Notes of Interest

Dr. Robert H. Cohen, orthodontist, wishes to announce the opening of an office in the Medical Arts Bldg., Suite 806, 1538 Sherbrooke Street West, Montreal, practice limited to orthodontics.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

American Association of Orthodontists

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President-Elect, Brooks Bell - - - - - - - - 4150 Mockingbird Lane, Dallas, Texas
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Central Section of the American Association of Orthodontists

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Secretary-Treasurer, Earl E. Shepard - - - - - - - - 4500 Olive St., St. Louis, Mo.

Great Lakes Society of Orthodontists

President, Richard E. Barnes - - - - - - - - - 638 Keith Bldg., Cleveland, Ohio
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President, Paul Hoffman - - - - - - - - - 1835 Eye St., N.W., Washington, D. C.
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President, Ernest T. Klein - - - - - - - - - - 632 Republic Bldg., Denver, Colo.
Vice-President, Curtis E. Burson - - - - - - - - 1232 Republic Bldg., Denver, Colo.
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American Board of Orthodontics

President, Stephen C. Hopkins - - - - - - - - 1746 K St., N. W., Washington, D. C.
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Director, Raymond L. Webster - - - - - - - - - 133 Waterman St., Providence, R. I.
Director, Ernest L. Johnson - - - - - - - - - 450 Sutter St., San Francisco, Calif.
Director, Lowrie J. Porter - - - - - - - - - - 41 East 57th St., New York, N. Y.